

# THE ATOM

Los Alamos Scientific Laboratory

June, 1965

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*Editor:* Earl Zimmerman

*Photography:* Bill Regan and Bill Jack Rodgers

*Contributors:* Members of the PUB staff

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#### **ON THE COVER:**

Tony Amsden's beautiful water color and ink illustration of the massive Pecos Mission ruins near Santa Fe is a reminder of the heritage northern New Mexico obtained from the Spanish. Like Pecos, two other little-known missions, Abo and Quarai, have been proposed for establishment as National Monuments. The story starts on Page 22. (Artist Amsden is a programmer in T-3.)

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# Short Subjects

**Five T Division staff members** participated in an international conference on the Application of Computer Methods to Reactor Problems which was held May 17-19 at Argonne National Laboratory. Bengt Carlson, T-1 group leader, was technical program chairman; Clarence Lee of T-4 was co-chairman of a technical session; Kaye Lathrop of T-1 presented a paper, "Use of the Discrete Ordinates Code DTF for Solution of Photon Transport Problems," and Edward Voorhees and Jack Worlton, both T-1, presented a joint invited paper, "Recent Developments in Computer Technology and Their Implications for Reactor Calculations." The conference was sponsored cooperatively by the Argonne Laboratory, the European Nuclear Energy Agency and the Mathematics and Computation Division of the American Nuclear Society.

**Helen Redman and Lois Godfrey** of LASL Libraries (D-2) were cited in the April issue of *Physics Today* for "doing something" to ease the crisis in technical document identification and reference procedures. An article titled "Source Retrieval" by Phyllis Richmond of the University of Rochester, praised the Redman-Godfrey "Dictionary of Report Series Codes" for its compilation and cataloging of identifying letter codes used by the multitude of government-sponsored agencies that publish research reports. The article deplored the lack of standard identifying codes for the tremendous amount of technical material in print and noted it is becoming extremely difficult for both scientist-reader and scientist-author to successfully pursue bibliographic sources.

**Dr. Raemer Schreiber**, Technical Associate Director of the Laboratory, received the first "Alumni of the Year" award from Linfield College at Mc-



Schreiber

Minnville, Ore., May 29. Schreiber, a 1931 graduate of Linfield, also was guest speaker at the annual alumni banquet, on the subject "Putting Atoms to Work." After graduating from Linfield, he received his masters degree from the University of Oregon in 1932 and Ph.D. from Purdue University in 1941, majoring in physics and mathematics. At Linfield he was editor of the *Linfield Review*, president of the student body and member of Alpha Gamma Nu fraternity.

**Eric B. Fowler**, H-7 Alternate Group Leader, is editor of a unique new book that presents scientific studies of the progress of radionuclides from detonation of a nuclear explosive to man. Titled "Radioactive Fallout: Soils, Plants, Foods, Man," it is to be published this month by Elsevier Publishing Company of Amsterdam, London and New York, major international text and reference publishing house. The book contains two chapters by LASL contributors: "Considerations of Biospheric Contamination by Radioactive Fallout" by Wright Langham of H-4, and "Relationship of Soil, Plant and Radionuclide" by Warren H. Adams, C. W. Christenson and Fowler, all of H-7.

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## Short Subjects . . .

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**J. J. Gutierrez**, whose local fame rivaled that of J. Robert Oppenheimer in the early days of Los Alamos, retired last month from the Zia Company. He was supervisor of Zia's Labor Pool. Gutierrez was the man you called when some sort of crisis arose during those crisis-common days in the mid-40's. Loudspeaker paging for "J. J. Gutierrez" became a sort of custom around the town-site and Main Tech Area. Gutierrez said his retirement plans aren't definite except he plans to live in Santa Fe.

**Stephen D. Stoddard**, head of the ceramics section in CMB-6, was named the nation's outstanding



Stoddard

young ceramic engineer at the annual meeting of the American Ceramic Society in Philadelphia, Pa., last month. Stoddard, 40, came to Los Alamos in 1952. He was cited by the National Institute of Ceramic Engineers for achievements "significant to his profession and also to the general welfare of the American people." A native of Everett, Wash., Stoddard is a graduate of the University of Illinois.

**Dr. William E. Ogle**, Alternate J Division Leader, was designated senior Atomic Energy Commission scientific representative for the Solar Eclipse Expedition in the South Pacific and for the cosmic ray observations near Australia that were to follow.

**Conrad Longmire**, Alternate T Division Leader, has been awarded the Air Force Commendation for Meritorious Civilian Service. The citation, by Air Force Chief of Staff J. P. McConnell, was in recognition of Longmire's 1962-1964 service on the Air Force Scientific Advisory Board.

**Northern New Mexico streams** will run high and long this year as a result of bountiful winter snows in the mountains. The runoff potential is the best since 1957 for southern Colorado and New Mexico, the Federal-State-Private Cooperative Snow Survey reported in May. Mountains in the Rio Grande headwaters area of Colorado have a near-record snowpack, upwards of 155 per cent of normal. The Soil Conservation Service, which issued the report, said low elevation snow will provide good early water in major streams and small tributaries and high elevation snow is expected to sustain runoff into the late summer.

**Stanislaw Ulam**, research advisor and veteran LASL staff member, will be a member of the faculty at the University of Colorado for the fall semester, as a Professor of Computing Science and Mathematics. Ulam served in a similar one-semester faculty capacity at Boulder several years ago.

**Dr. Carroll W. Zabel**, former Alternate K Division Leader at LASL and now Associate Professor of Physics at the University of Houston, has been appointed to the AEC's Advisory Committee on Reactor Safeguards.

**Gerold H. Tenney**, GMX-1 Group Leader, presented a paper, "The Role of Nondestructive Testing in the Los Alamos Reactor Program," at the International Atomic Energy Association Symposium on Nondestructive Testing in Nuclear Technology that was held in Bucharest, Romania, May 17-21. Tenney, who organized the NTG group at LASL more than 21 years ago, was designated Senior Member of the eight-member United States delegation to the conference.

**Harry Dreicer**, P-14, who is on a EURATOM fellowship doing plasma research at Frascati, near Rome, Italy, has had a research paper published there. Titled "A Technical Proposal for a Research Tool Involving Thermally Ionized Plasma: A Meshed Microwave Resonator Probe," it discusses the properties of a heated metallic resonator.



**Leonard W. Kissinger**, 51, GMX-2, died May 10 at Los Alamos Medical Center following a lengthy illness. Kissinger, who joined the LASL staff in September, 1949, received his BS degree from State Teachers College, Kutztown, Pennsylvania, and his MS and Ph.D. degrees in chemistry from the University of Pennsylvania.



Kissinger

He is survived by his wife, Helen; a son, Glenn; and daughter, Elaine.

**Phil N. Dean** and **Chet R. Richmond**, both of H-4, co-authored a paper, "Automatic Data Acquisition, Reduction and Analysis," that Dean presented at an International Atomic Energy Agency symposium on Radioisotope Sample Measurement Techniques in Medicine and Biology that was held in Vienna, Austria, May 24-28.

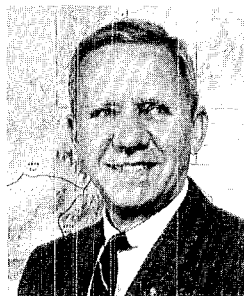
A six-room addition to the Pinon Elementary School will be built this summer and is scheduled for completion by the opening of school in the fall. Successful bidder for the Atomic Energy Commission construction contract was La Mesa Builders, Inc., of Albuquerque. Cost of the work, which will include an outdoor basketball court, a softball field and covered walkways linking with the present school buildings, is \$176,666.

**Thomas Wimett**, N-2, reported on "Fast Burst Reactors in the USA" at the International Atomic Energy Agency Symposium on Pulsed Neutron Research that was held in Karlsruhe, Germany, May 10-14.

**Jerry Conner**, P-4, attended the annual COSPAR meeting in Buenos Aires, Argentina, May 10-21, and presented papers on "Solar X-Ray Measurements" and "Spatial Distribution and Energy Spectra of Electrons Near 17.7 Earth Radii." Co-authors of the papers, which are based on data received from P-4's orbiting satellites, are **Eldon Stogsdill**, **Sid Singer**, **Michael Montgomery** and **Conner**.

Briefings on three space-oriented fields of LASL research were given more than one hundred members of the Aviation/Space Writers Association who came to Los Alamos May 19. The group was greeted by LASL Director **Norris Bradbury** and then heard reports from **Art Cox** of J-15 on the Solar Eclipse Expedition, Alternate N Division Leader **Frank Durham** on Phoebus reactor development for Project Rover, and **Herman Hoerlin** of J-10 on results of the 1962 high altitude weapons tests in the Pacific, the nuclear burst detection program and the February 1965 observations of the aurora borealis from Fort Churchill, Canada.

A Honolulu Area Office of the Atomic Energy Commission was opened May 1. The office, located at 531 Ohohia Street, will take over the activities of a small administrative and engineering staff that has been located in Honolulu for several years, **William A. Bonnet**, who has been deputy manager of the AEC's Nevada Operations Office, has been appointed Area Manager of HAO.



Bonnet

**Myrl F. Smith**, formerly special assistant to NVO Manager James Reeves, has been named to fill a new position of Special Assistant for Pacific Operations in NVO. He also will serve as AEC deputy to the commander of Joint Task Force 8.

# They

By PETER MYGATT


When John Bolton, head of LASL's Engineering Department (ENG), packs into the Pecos high country on his occasional escapes from duties on the Hill, he does it with the same savvy with which he runs his Department.

Except for magnitude, running a big engineering operation is not much different from packing into the wilderness so far as Bolton is concerned; knowhow and imagination lighten the load for everyone.

He engineers his trips so he can travel fast and with little weight. Besides a light bedroll and tarp, he carries a small collapsible frying pan, cup, utensils, meat, potatoes, coffee and fresh eggs.

Anyone who has ridden or hiked into the mountains knows it's no mean task to come by fresh eggs in the boondocks, but the way Bolton does it is simple. He carefully cracks the eggs, filling a container clear to the top, and then seals it. No worry about breakage and they stay fresh.

Bolton, who vacationed in northern New Mexico while working with Pittsburgh Glass in Corpus



John Bolton, head of LASL's Engineering Department, doesn't have to go far to survey some of the work under his jurisdiction. From the top of the Administration Building he can look down on the addition to the Computer Building (left) and a two-building addition to the Administration Building complex. This multi-million dollar construction project is about 75 per cent complete.

# Help LASL Grow

## Keeping Tab on 658 Buildings Is Only One Of Duties for John Bolton and ENG

Christi, Texas, joined the LASL staff as Assistant CMR Division Leader on December 26, 1946. He transferred to ENG in January, 1949, and five months later became Department head.

When Bolton joined ENG it was a group (A-5) within a larger entity which included what are now the Shops Department, Graphic Arts (D-8), and Illustration (D-3). In those days LASL had a gross value of \$38.9 million, but was experiencing severe growing pains as it was beginning to expand onto South Mesa. Today the Laboratory has a gross value of \$211 million.

Engineering in 1949 was a rather modest group—it had 40 tracings and 40 people. One of the first jobs Bolton accomplished was the consolidation of Engineering functions within the Laboratory—functions carried on more or less at random by various divisions, departments, and even groups.

Today there are 150 people on the ENG staff, and some 40,000 tracings in file—drawings of every

facility on the LASL books. One reason the Civil Defense shelter effort was so successful at Los Alamos in the fall of 1961 was because ENG had plans in hand of all possible shelter areas—plans of buildings as originally planned, as actually built, and as modified.

Since ENG is generally working against both time and money, the Department's activities are fairly conservative in concept. However, ENG does face diverse and novel situations. Take the case of Indian construction crews who were plying their trade on the Pajarito Plateau some 800 years ago, they had no idea the ruins of their efforts would hold up progress in the atomic age. A filter house at DP Site, where plutonium metallurgy is carried out, had to be relocated because an ancient Indian ruin stood in the way. And construction of Two Mile Mesa road came to a standstill when more ruins were discovered. Delays were the result of the Federal Antiquities Act which says that items of archeological interest

must be preserved or excavated and salvaged as specified by the Act. ENG finally got together with the Department of Interior, and Fred Worman of LASL's H-8 group was named official archeologist to survey and excavate ruins which have to be disturbed by construction.

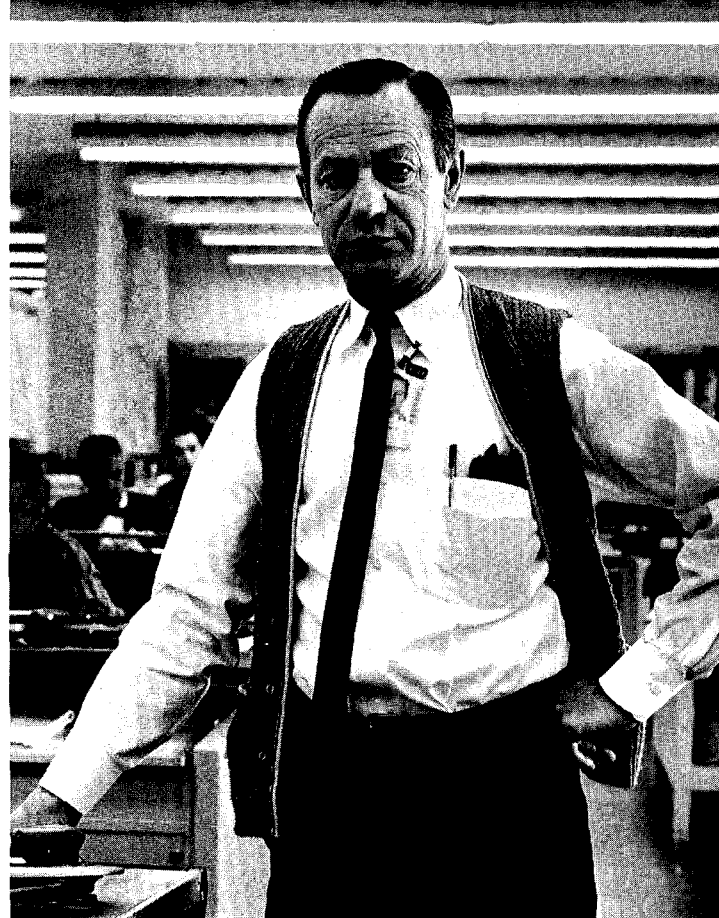
ENG must be versatile. When the plutonium fabrication plant was being constructed, one of the specifications was the installation of a fast-actuating, three-way valve that would put steam, tempered water, and refrigerated glycol into the system in rapid succession. Since such a valve did not exist, ENG promptly designed and developed the device.

One of the more recent problems solved by ENG was in the writing of a computer program (The Atom, Oct. '64) that essentially solves problems for virtually any conceivable piping system. James H. Griffin, ENG-1, wrote the program specifically to analyze stresses

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Charles Wherritt ..... Planning



J. B. Weldon ..... Design

## ENG . . .

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caused by expansion in piping systems of new LASL reactors—particularly the Fast Reactor Core Test Facility (FRCTF) and the Ultra High Temperature Reactor Experiment (UHTREX).

Another of the minor headaches facing ENG is the fact that all Laboratory land usage requests are handled by the Department. Numerous requests for grazing privileges and hay cutting rights within technical areas have been denied by Engineering, but perhaps the strangest was the case of the bee keeper who felt he'd been stung by ENG because he was not allowed to place his bee hives near some blooming clover at S-Site.

Actually most of ENG's work is not at all bizarre in nature.

Besides supervising ENG, Bolton has had the basic responsibility for general construction, mainten-

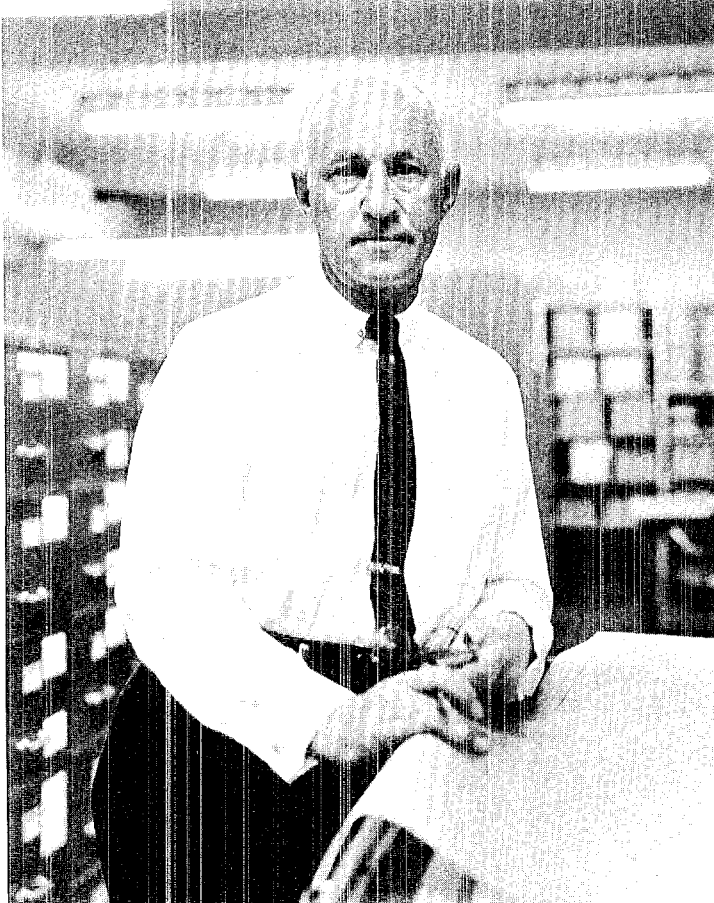
ance, repair, upgrading, and modification of the Laboratory physical plant; has represented the Laboratory in dealing with the AEC and with contractors on engineering matters; developed and maintained Laboratory policies with regard to plant engineering; developed long-range plans and budget forecasts in cooperation with technical division leaders and the Director's office; established construction and maintenance schedules and set priorities where these have been needed; monitored actual costs and compared these with forecasts; and verified that plant engineering practices conform to national codes and specific government regulations.

It was this complexity that led to Bolton's appointment as Assistant Director for Engineering on August 14, 1950.

ENG is now organized into four groups to carry out the functions of the Department.

Planning (ENG-1), under Charles R. Wherritt, discusses requirements for physical plant additions and major modifications with the various technical divisions, and develops preliminary plans and specifications; prepares schedules and forecasts or requirements for general plant modernization and upgrading; provides design support to technical divisions by assignment of ENG personnel to those divisions; inspects major construction projects prior to acceptance; and operates a model making shop.

Design (ENG-2), under J. B. Weldon, develops preliminary design and cost estimates for all new construction and modification projects; provides construction drawings for all projects which are not transferred to the AEC for architect-engineering (A-E) contracting; and provides consultations and cost estimates to technical divisions for plant improvement and new equipment budget forecasts.



S. E. (Ted) Russo ..... Records



Charles A. Reynolds ..... Maintenance

Records and Land Survey (ENG-3), under S. E. Russo, maintains and updates all record drawings of the physical plant; performs surveys as required for planning or record purposes; maintains building occupancy records; and provides miscellaneous service functions for the entire Engineering Department.

Maintenance and Construction (ENG-4), under Charles A. Reynolds, provides direction and general supervision to the Zia Company for maintenance and minor construction; monitors and inspects Zia/LACI construction and plant modifications; maintains resident representatives at all major facilities of the Laboratory; budgets maintenance operations, and maintains fiscal control of maintenance contractors.

And ENG will grow in the next few years.

The Department will take over Laboratory communications, a

group to be designated ENG-5, within the next year or two. This will include direction of the telephone service contract; maintenance of radio installations, intercoms, and the ADT security system; communications traffic analysis; and planning and scheduling of system improvements.

Considerable cooperation is required between Engineering and the local AEC office because Laboratory physical facilities are owned by the Atomic Energy Commission. All planning of new technical facilities is done by ENG, while plans for expansion and upgrading of roads and utilities are normally a joint AEC-ENG-Zia enterprise. Detailed design and A-E of plant additions and modifications are performed under AEC contract for all large projects to be constructed by lump-sum competitive bidding, although LASL retains responsibility for procurement and installation of specialized

equipment. ENG performs the A-E functions for numerous small projects plus those involving highly technical installations or special security or safety requirements. The services of the Zia housekeeping contractor and its subsidiary, LACI—a cost-type construction contractor, are used by ENG for maintenance and incidental construction. The costs of these latter services are included in the LASL financial plan.

Annual operating expenses of ENG are about \$1.5 million; annual new major construction costs approximate \$8 million; while annual maintenance and minor construction costs are approximately \$10 million.

The Engineering Department is responsible for a Laboratory that covers a land area of 31 square miles, or some 19,880 acres. There are 658 structures in the area, with a total of 3.4 million square feet of floor space.

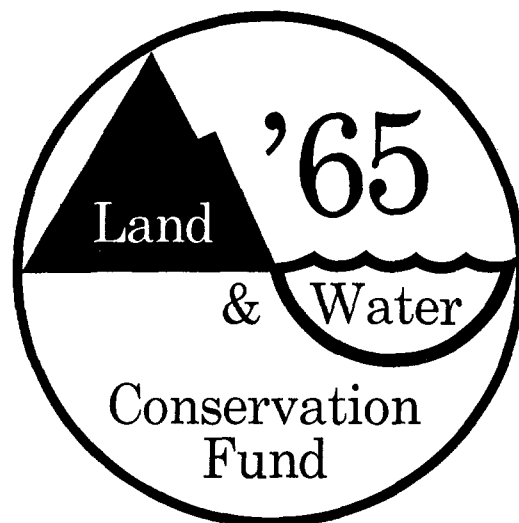


# PAY for PLAY

Forest Facilities Improved  
But Fee Charged

By **ROBERT BRASHEAR**

Outdoor Recreation



for America

United States Government Federal Recreation Area Annual Permit No. 000,000

Specialization has hit the hills.

Forest supervisors faced with skyrocketing demand for recreation facilities are designating special camps for campers, picnic spots for picnickers and "parking-for-fishing only" streamside clearings for fishermen.

And as is the nationwide case with most Federal playgrounds, there's now a pay-for-play fee.

This new philosophy of shaping the Great Outdoors to fit the use is bringing many changes to campgrounds and recreational sites that are within easy reach of Los Alamos.

Since face-lifting funds haven't come in large amounts to the Forest Service, money that accrues from Land and Water Conservation Fund receipts (the fees) will be used to acquire more land, to improve existing sites and develop new ones.

Forest users this summer will find that much has been done since outdoors gear was stowed last fall and that a number of other major im-

provement projects are still in progress and will be completed during the season or by next year.

In the Jemez Mountains portion of the Santa Fe National Forest (which more or less surrounds Los Alamos), many of the old familiar spots have been refurbished, like Las Conchas just beyond the Valle Grande on Highway 4, and a few have been closed or their use changed or restricted.

San Antonio Campground has been rebuilt and has 26 family units for camping and picnics and another 10 units for handicapped persons. The latter have paved ramps to the stream for fishing from a wheelchair.

The Paliza Organization Site, which is designed to accommodate large groups, is complete and reservations should be made with Jemez Forest Ranger Fred Sweatman. East Fork Site, where Highway 4 crosses a branch of Jemez Creek, has been closed and will be changed to a fishing-only area. The same use will be reserved for

the former Dark Canyon, Hot Springs and Indian Head picnic areas that were strung along the highway near Jemez Springs. Highway construction in that area probably will prohibit much use of any sort there this summer, though.

Forest Service officials say their new philosophy and development plans call for recreational sites to be located in large open areas away from streams, leaving quiet turnout locations to the anglers. The availability of water and amount of cleared land and accessibility are major determining factors in the designation of camping and picnicking spots.

Farther from home, in the Sangre de Cristo portion of the Santa Fe National Forest, there have also been changes. The Field Tract campground in the Pecos country has been enlarged to 13 units and the Dalton site, which is also north of Pecos on State Road 63, has been cut from 7 to 3 picnic sets and will eventually become a fishing-only location.



High pine and aspen forests of northern New Mexico are getting additional facilities for picnicking, camping and

fishing as rapidly as funds permit. New use fees will help meet the rising nationwide demand for recreation sites.

Along Gallinas Creek west of Las Vegas seven sites have been designated for picnicking only. They are Oak Flats, Baker Flat, El Codo, Fishing Hole, Big Pines, Brides and Tilted Rock. Drinking water is not available at any of them.

Adjacent to Hyde State Park—in the Sangres just outside Santa Fe—the Forest Service's Black Canyon camping area is being increased from 11 to 50 family units. Road work is now in progress and campground improvements will be started in July. Two other major improvements not yet complete are in the Carson Forest: Santa Barbara Canyon near Penasco, about 25 units, and Fawn Lakes

between Questa and Red River, about 22 units.

Future Forest Service improvements include a big one in the Jemez range. A camping-picnicking development with at least 100 units is scheduled for construction along Highway 4 between the Baca Location and La Cueva. Development hinges on money and progress in paving the highway, but officials predict it will be "within the next few years."

And those long-view enthusiasts who have been waiting patiently for eons for easy access to St. Peter's Dome will probably be satisfied by next year. A new contract will be let this summer for completion of an all-weather road linking High-

way 4 and the Forest Service roads south of the Baca Location. A picnic area site has been selected for development just within the forest land, but it will be without water. The road south from the Dome down Cochiti Canyon is also going to be improved.

Of great concern to the Forest Service is the administration of the user fee regulations. On sale will be the standard \$7 annual use sticker as well as short-term use tickets. The \$7 sticker is the same that is sold nationwide and is available at Bandelier National Monument. Buy one and you've got it made—access for all the occupants of a

continued on next page



"Fishing Only" areas are replacing some roadside picnic spots in the National Forests. There is parking space and easy access to a stream for anglers who want to fish undisturbed.

## Forests . . .

continued from preceding page

vehicle to National Parks, National Forests, Wildlife Refuges, designated areas operated by Army Engineers and the Bureau of Reclamation (like Abiquiu Dam and Navajo Dam and Lake) and most other Federal facilities used for recreation.

Daily and in some cases weekly use fees are charged for specific locations and may be preferred by persons who are not frequent visitors. In the Santa Fe Forest the daily use fee for designated sites is 50 cents per person for all over 16 years of age; there is no charge for persons under 16. Regulations also authorize the collection of additional special fees for some special facilities, such as cabin rental, guide service, improved camp sites, etc.

Those areas in the Santa Fe where fees are assessed have been posted. Fees can be paid to Rangers and other Forest Service personnel who will be on patrol. The annual stickers can also be bought that way and are available at Forest Service offices as well as other Federal agencies included in the Land and Water Conservation Fund program.



## *Opera Lectures Offered Again by Guild, Schools*

A unique educational service will afford Los Alamos young people—and their elders, too—an opportunity again this season to learn about the world's great operas.

The third annual Youth Opera Lecture series, free and open to the public, will be sponsored by the Los Alamos Opera Guild and the Los Alamos Schools Music Department. Aimed at increasing the knowledge and enjoyment of opera among young people, the lectures are given before each of the Youth Operas presented by the Santa Fe Opera Association. Speakers, who often use records, slides and demonstrations, are local opera enthusiasts who contribute their time.

The lectures, at the Pajarito School Auditorium, will be:

June 27, 7 p.m., "La Traviata" by Giuseppe Verdi, Mrs. Lewis Agnew, speaker; July 1, 7 p.m.,

"Madame Butterfly" by Giacomo Puccini, Mrs. John Northrop, speaker; August 8, 7:15 p.m., "The Nose" by Dmitri Shostakovich, Mrs. Leon Heller, speaker, and August 15, 7 p.m., "Marriage of Figaro" by Wolfgang Mozart, Mrs. Donald Hagerman, speaker.

The Youth Operas, which are final dress rehearsals by the Santa Fe Company, are performed a half-hour earlier than regular performances. Tickets, which are available at the box office or at the Los Alamos Building and Loan, are \$1 for non-adults and \$2 for accompanying adults. There must be five non-adults for every adult attending.

The Youth Opera schedule: "La Traviata," June 28; "Madame Butterfly," July 6; "The Nose," August 9, and "Marriage of Figaro," August 16.



George A. Cowan, J-11 Group Leader, admires his medal and citation after presentation of 1965 Ernest O. Lawrence Memorial Award in Washington, D.C. Cowan was cited by AEC Chairman Glenn Seaborg (center) for accomplishments in the application of radiochemistry to weapons diagnostics and for his pioneering use of nuclear explosions as neutron sources in fundamental physics experiments. At left in photo is a former LASL staff member, Theodore B. Taylor, who also won a Lawrence Award. Taylor, now with the Defense Atomic Support Agency in Washington, was at Los Alamos from 1949 to 1956 and was a consultant until 1964. He was cited for his contributions to nuclear weapons design and for his role in the development of the TRIGA research reactor. In addition to the medal and citation, Lawrence Awards include a \$5,000 prize.

## How's That?

Los Alamos scientists Edward Hammel, Eugene Kerr and Robert Sherman wondered if they were in for a quilting bee and gossip session or scientific meeting when they arrived at a Washington, D.C. hotel recently.

The LASL cryogenics specialists were bound for a meeting titled: "Conference on Phenomena in the Neighborhood of Critical Points."

But signs pointing the way to their meeting place bore the legend: "Conference on Phenomena in the Neighborhood."

# *'Old Timers' List*

## *Gains 149 More*

The Laboratory's veteran-employee roster climbed another 149 last month with the presentation of service pins. Employees with 10, 15 and 20 years of continuous service at LASL were cited by Director Norris E. Bradbury in a ceremony May 20 in the Administration Building Auditorium.

There were 28 who had passed the 20-year mark since the autumn 1964 tally; 67 more have marked 15 years at Los Alamos, and there are 54 new 10-year veterans.

In all, 194 were called for service pins at the ceremony. The additional people were those who had become eligible earlier but were not present for their pin presentation.

The list (\* denotes prior eligibility):

### **20 Years**

Robert J. Adams, SD-1; Melvin L. Brooks, GMX-3; Laurence J. Brown, P-1; Arthur W. Campbell, GMX-8; Robert S. Dike, P-16; Hannibal M. Fraga, SD-4; James L. Gallant, GMX-3; Charlsie E. Gregory, P-1; John C. A. Grinnell, GMX-3; Lowell F. Grubbs, SP-4; Armand W. Kelly, J-1; Rufina V. Ladabour, GMX-7; Charles F. Metz, CMB-1; Polly L. Montoya, H-1; Donald W. Mueller, P-11; \*Norris G. Nereson, P-2; William E. Ogle, J-DO; Maria A. Pacheco, GMX-7; Amelia Rodriguez, GMX-7; Louis Rosen, P-10; Max F. Roy, DIR OFF; Antonia M. R. Salazar,

GMX-7; Arthur R. Sayer, W-4; Alan G. Spooner, SD-4; James M. Taub, CMB-6; Hugh B. Tucker, SD-O; Dwayne T. Vier, CMB-3; Donald Watts, SP-4, and Dorothy J. Tully, SP-LA.

### **15 Years**

William P. Aiello, P-1; Robert Apodaca, GMX-3; Felix B. Archuletta, GMX-3; Milton G. Bailey, GMX-1; \*James J. Banta, W-1; Paul E. Barbo, W-3; Frank Barylski, SD-5; Morris E. Battat, K-1; Howard T. Belfrey, SD-4; William Bernard, N-2; \*Joseph B. Bourne, Jr., GMX-3; \*Thomas J. Boyd, Jr., GMX-11; C. Austin Burch, H-3; Eduardo Catanach, Jr., GMX-3;

Walter R. Ciddio, SD-1; Robert A. Clark, K-3; \*Filmore F. Criss, N-1; Leonard Crogstad, SD-1; Francis V. Dare, GMX-3; Roderick S. Day, CMB-11; Donald C. Dodder, T-9; \*John E. Dougherty, W-3; Floyd L. Evans, SD-5; \*Peter Fagan, GMX-4; \*I. Frank Farrar, Jr., ENG-4; Alfred B. Fernandez, H-1; Margaret E. Gibson, P-10; Edward G. Gould, GMX-3; Elizabeth R. Graves, P-6; Charles H. Gregory, GMX-3; James D. Griffin, GMX-7; Pauline E. Heimbach, SP-2; Richard L. Henkel, P-9; Richard D. Hiebert, P-1; William G. Hudgins, T-1; Nelson Hunter, GMX-3; Arthur J. Justus, GMX-3; \*Hugh J. Karr, P-14; William J. Kelley,



SD-5; Bernice S. Kelly, T-DO; \*Edwin L. Kemp, Jr., P-16; William B. Kirkpatrick, N-7; \*Jere Knight, J-11; G. Ellen LaPlant, J-DO; Donald A. Larson, J-8; Wallace T. Leland, P-10; \*Kathryne B. Lewis, PER-1; Bernie Q. Martinez, AO-4; Luis A. Lucero, GMX-3; Mariano J. Lucero, GMX-3; Robert G. McQueen, GMX-6; Carl T. Maes, GMX-3; Antonio F. Maestas, GMX-3; Robert D. Marlett, SD-1; \*Phil S. Marrs, GMX-3; Benjamin O. Martinez, GMX-3; \*Juan P. Martinez, GMX-3; Homer C. Milford, ENG-4; \*Andres Montoya, SP-3; \*Willie Montoya, SP-4; \*Austin M. Morgan, SD-5; \*Thomas W. Newton, CMF-2; Joe R. Nichols, CMB-11; Edward I. Onstott, CMB-8.

Robert C. Peck, W-3; \*John Pilch, D-8; Celeste I. Porto, H-5; John L. Quackenbush, SD-1; Stanton W. Reid, SD-1; Norman Riechman, SP-2; Acorcino O. Romero, GMX-3; \*Edgar B. Rynd, W-1; Charles R. Saunders, N-7; Adam F. Schuch, CMF-9; Robert R. Sharp, SD-5; Lois J. Simons, D-2; John A. Sizer, ENG-3; Frank R. Slovack, SD-1; Lillard F. Son, GMX-3; William E. Stein, P-2; \*Donald E. Stevens, P-1; \*D. Lloyd Williams, H-4; Wendell R. Williams, GMX-3; John G. Williamson, GMX-7; Thomas B. Williamson, GMX-3; Walter R. Wykoff, K-3; \*Eugene G. Zukas, CMF-13; Duncan Curry, Jr., J-3/NTS, and Donald E. Grimm, J-9/NTS.

#### 10 Years

Donna M. Arnold, SP-4; \*Floyd B. Baker, CMF-2; Herman P. Baker, ENG-2; John F. Barnes, T-5; George O. Bjarke, P-1; Rea Blossom, J-6; \*Wilmetta E. Brown, GMX-8; Leonard Buettner, GMX-4; \*Donald R. F. Cochran, P-11; Don O. Coffin, W-3; Bernardita A. Cordova, GMX-7; Richard L. Cubitt, K-1; \*William C. Davis, GMX-8; Dana L. Douglass, CMF-5; Thomas C. Doyle, T-1; Donnie F. Drake, W-4; \*Harry Dreicer, P-14; \*Jerome E. Dummer, H-1; John H. Enright, D-8; Gordon S. Erickson, GMX-4; Verna L. Gardiner, T-7;

## New Hires

Eugene V. Hawkins, Albuquerque, N.M., SD-2.

Robert Rice Swain, Albuquerque, N.M., J-11 (Short Term).

Ernesto C. Martinez, Santa Fe, N.M., GMX-7.

Charles B. Becherer, Albuquerque, N.M., K-1.

Jo Ann Parrack, Albuquerque, N.M., Bus. Off. (Rehire).

Everett Reed Weesner, Phoenix, Arizona, ENG-3.

Robert Wayne Winks, Salisbury, N.C., J-9 NRDS (Rehire).

Ernest W. Kazmier, Los Alamos, D-8.

John J. Alexander, Albuquerque, N.M., SP-3.

Dennis R. Hill, Upland, Calif., K-4.

John Ralph Montoya, Los Alamos, SP-3.

Paul Fermin Martinez, Indio, Calif., M&R.

Kenneth B. Bowman, La Porte, Indiana, K-3.

George Arthur Salazar, Velarde, N.M., T-1.

Lela Katherine Stiles, Los Alamos, PER-DO, (Rehire-Casual).

John Chester Newton, Grainfield, Kansas, W-7.

Charles Roscoe Dyer, Cherokee, Oklahoma, ENG-1.

Donald Eugene Dixon, Santa Fe, N.M., SP-1 (Rehire).

Lloyd L. Catlin, Glasco, Kansas, P-9.

Paschal T. Langham, Brownfield, Texas, H-1.

Thomas B. Geelan, CMF-9; \*Elmer L. Grady, SD-5; Ralph H. Greenwood, P-4; \*Emma M. Henderson, T-5; \*James F. Hipkind, GMX-3; Lena M. Hobbs, PER-4; \*Carl Holton, GMX-4.

Merle W. Carter, SD-O; Evelyn C. Hughes, H-1; Vernon N. Kerr, H-4; Kathryn M. Killoran, GMX-3; \*Andrew M. Koonce, J-8; Ivan K. Kressin, CMF-4; \*Clarence E. Lee, T-4; Jules S. Levin, P-9; Glen H. Livermore, P-14; \*Merced M. Lopez, W-3; John L. Lundgren, K-4; Charles L. Mader, GMX-2; \*Maurice E. Manes, W-1; David A. Martinez, SD-O; Edward Martinez, M&R; Venancio Martinez, J-16; Ernestino Mirabel, GMX-3; H. Nadine Moyer, SP-1; Clayton E. Olsen, CMF-13; Willie V. Ortiz, D-4; \*Donald G. Ott, H-4; \*Francis O.

Peters, W-4; Eugene A. Plassmann, N-2; Melvin H. Rice, GMX-6; Prince E. Rouse, GMX-2; \*Nora C. Sanchez, W-4; Herta A. Schmidt, T-1.

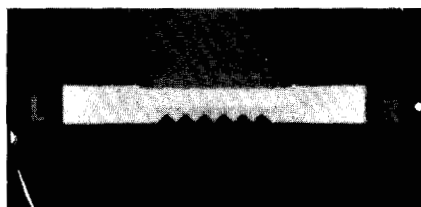
James E. Simmons, P DO-R; Ruby N. Smith, GMX-7; Leland B. Sprouse, J-16; Ted Starnes, PER-4; W. Amos Stone, CMB-7; \*Thomas F. Stratton, N-5; \*Theodore Suina, W-1; Elizabeth M. Sullivan, H-4; \*R. Dean Taylor, CMF-9; Edgar A. Thomas, P-1; Luciano Torres, GMX-7; Elizabeth Tynan, T-1; Arthur A. Usner, N-2; \*Angie T. Van De Valde, PER-3.

Alvin A. Van Dyke, CMB-7; Robert W. Walker, CMB-11; Donald R. Westervelt, J-10; Robert C. Whittemore, CMB-6; Frederick E. Wittman, P-14; \*Walter P. Wolff, J-8, and Nancy Hillhouse, SP-LA.

# PHERMEX

## GMX-II Electron Accelerator Is Huge X-Ray Device

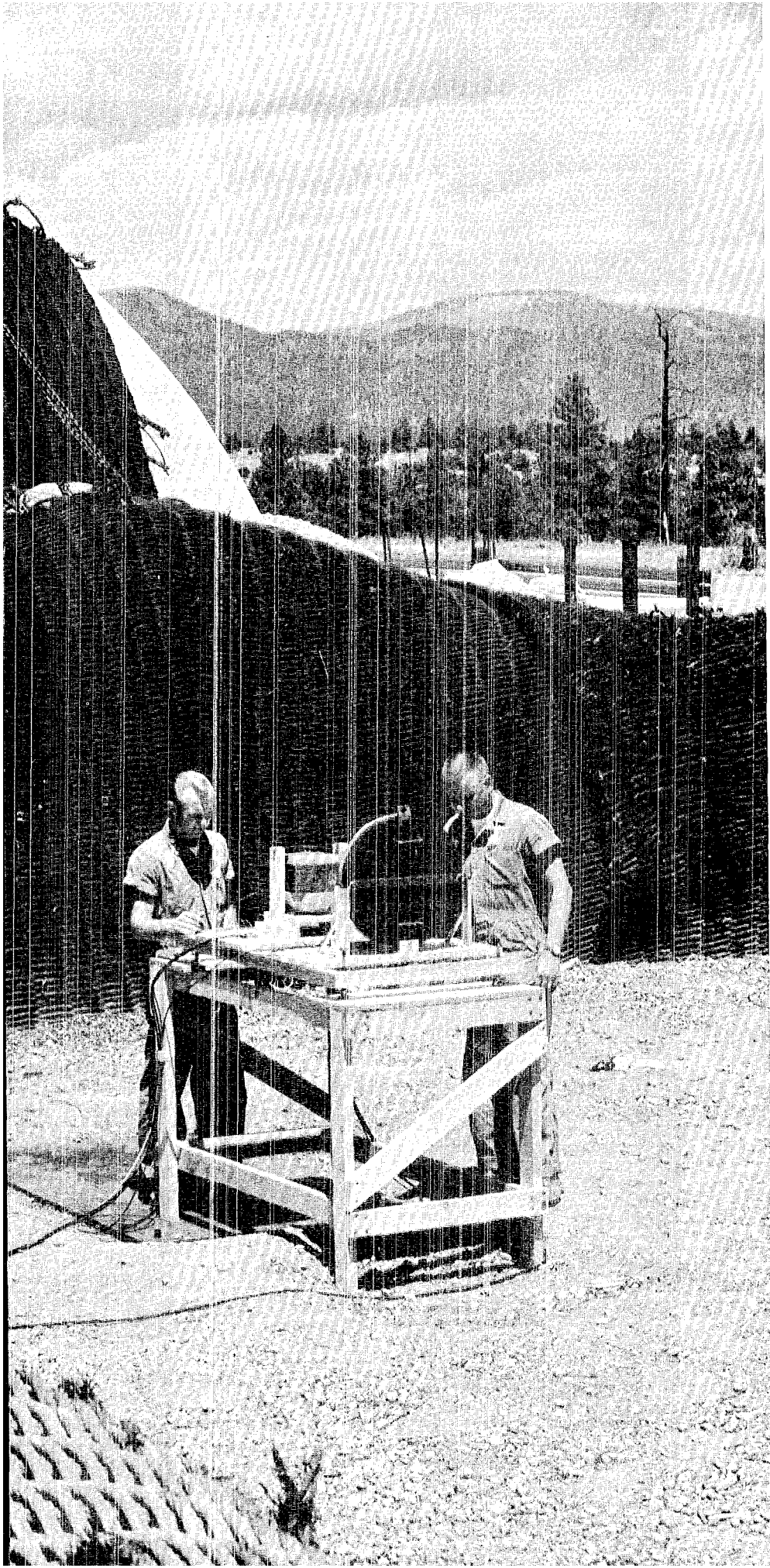
By EARL ZIMMERMAN



Left: This set of radiographs of three identical shock experiments represents the lapse of less than 16 millionths of a second and illustrates the effect of an explosives shock on a grooved aluminum plate. Scientists are especially interested in the fluid-like "wave" action that is apparent on the top of the plate and in the "jets" that arise from grooves. The aluminum behaves like a liquid because it is under extreme pressure.

Right: Gerald Taylor (left) and Bobby Poe set up experiment for PHERMEX. Table holds explosive and material to be studied. Black disk is an x-ray film protective container. X-ray beam will come from "bull nose" protruding from steel mat-protected chamber.





Particle accelerators are often used to enable physicists to learn more about nuclear structure. LASL has a number of accelerators with that function. One of the Laboratory's most powerful machines, however, is an electron accelerator designed and built by engineers and scientists of GMX-11 whose interest is in fluid dynamics and in the behavior of matter under extreme pressure conditions. The instrument of their trade is PHERMEX, an acronym for Pulsed High Energy Radiographic Machine Emitting X Rays.

Although it is fundamentally a particle accelerator and is potentially capable of many kinds of nuclear physics experiments, PHERMEX is used for a single purpose—the production of an x-ray beam of very short time duration and of very great intensity. It provides scientists with eyes to see what happens in the interior of an explosive experiment while violent action takes place as a result of the detonation process.

In principle, PHERMEX is not unlike the x-ray machines common in hospitals and dentists' offices, but in reality, it is probably the world's largest such device that is used for flash radiographic (x-ray picture) work. Target current of PHERMEX, that is, the focused electron beam impinging on the x-ray-producing tungsten target, is 20 amperes. In contrast, beam currents in dental x-ray machines are measured in milliamperes. The beam energy is approximately 20 million electron volts, in contrast to machine energies of, at most, several hundred thousand electron volts in medical facilities.

Another big difference is that the specimen to be x-rayed doesn't have to remain motionless. Quite to the contrary, with the pulsed

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## PHERMEX . . .

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burst inherent in its operating design, PHERMEX takes "flash" x-ray pictures at "shutter speeds" of two-tenths of a millionth of a second. During this short interval of time, a negligible motion occurs in the shock-driven material, which may have been jolted by a pressure in the megabar range—a pressure of a million atmospheres or so.

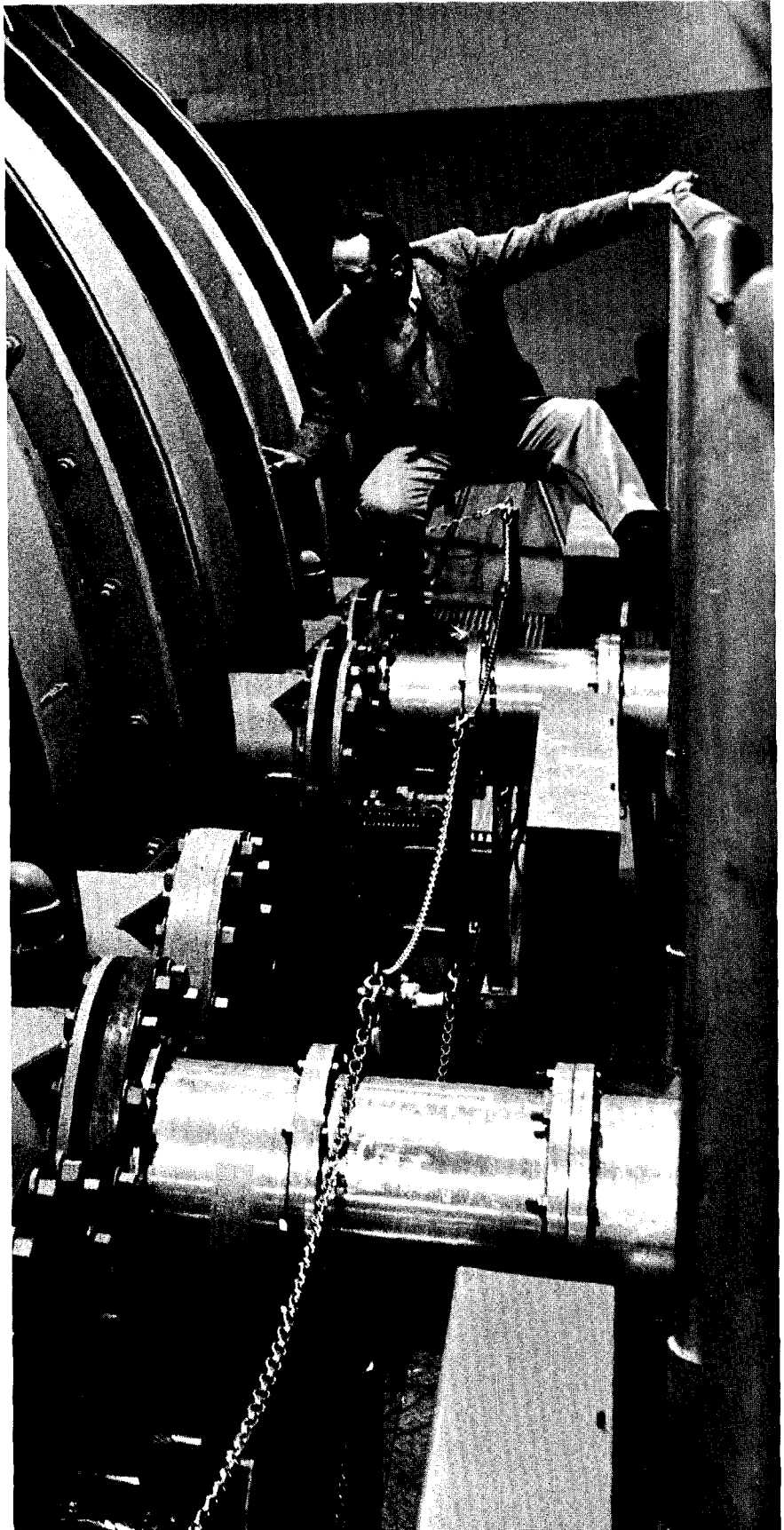
There is need and use for a machine like PHERMEX because of a long-known but difficult-to-study physical phenomenon: Seemingly solid materials, like iron, exhibit more the characteristics of fluids when subjected to extreme shock pressures. Such behavior suddenly became very important when nuclear weapons development began. Such early weapons pioneers as Darol Froman and Donald Kerst actually performed rudimentary radiographic/fluid dynamics tests at Los Alamos some 20 years ago, using a betatron to generate x rays. A number of other devices have been used over the years at several places for radiographic observations of extreme shock conditions, but PHERMEX is the first installation specifically designed for that purpose with adequate intensity to do the job properly for devices of interest to the Laboratory.

"Flash radiography is one of the very few methods by which it is feasible to make direct observations

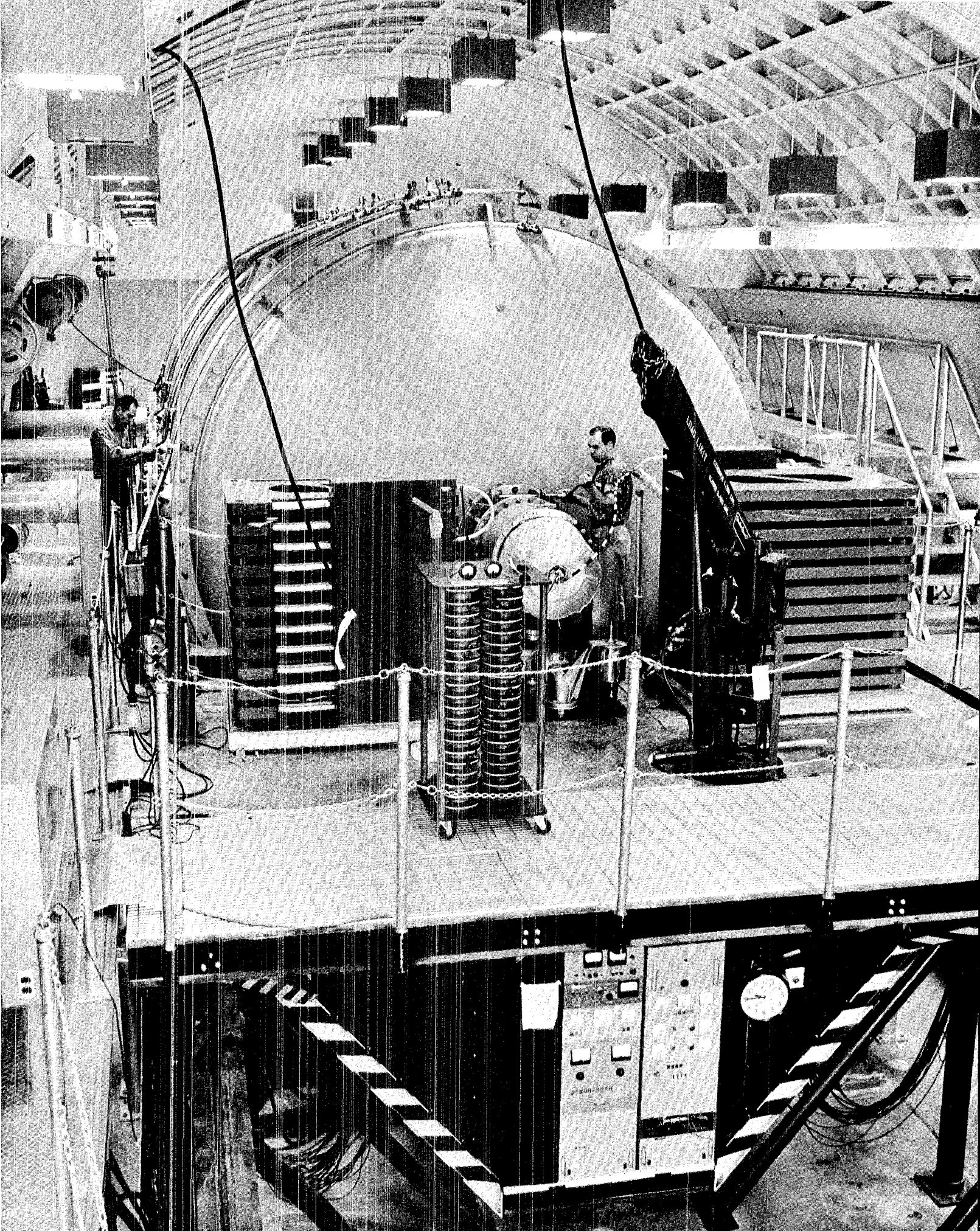
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Right: Buck Rogers inspects vacuum seal at observation port in PHERMEX cavity. An overnight of pumping is required to achieve vacuum necessary for accelerator operation.

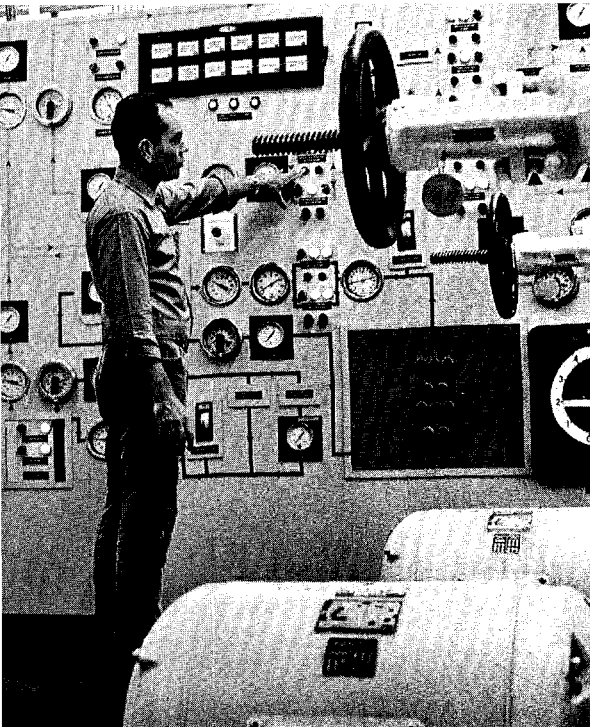
Opposite page: Vacuum valve on electron injector is checked by Jim Ruhe (center) while Rick Fuller makes an adjustment at side of PHERMEX cavity. Radiation makes it necessary to remove personnel from building during accelerator operation.











## PHERMEX . . .

continued from page 16

of consequences of extreme pressure situations, and in many instances it is the only method available," according to Fred Tesche, GMX-11 Group Leader, who is one of the original team members in the launching of the PHERMEX project.

Since explosives systems are reproducible to carbon-copy conditions (thanks in large part to technological advances by GMX groups), PHERMEX can provide radiographs with a time dimension. By delaying the x-ray burst slightly in successive but identical explosives firings, it is possible to obtain a series of radiographs. When viewed in sequence, mass displacement, or flow, can be observed as it develops and runs its course.

PHERMEX experiments range from classified work with mockup nuclear weapons components to wholly unclassified research studies of the properties of matter and the behavior of shock waves. Fluid behavior of shock-driven materials can be predicted to some degree by theoretical means, and many situations can be analyzed with computers, but it remains for so-

Rick Fuller's water control panel in basement of Power Control Building gives instant information on status of three water systems vital to operation of PHERMEX. Deionized water is a coolant in radio-frequency and capacitor rooms; other systems use chilled water for cooling

called "field testing" to prove out the theories. Other behavior such as cratering and spalling, and the formation of jets and their interactions with matter, must be seen to be fully appreciated in their form and effects.

A PHERMEX experiment is not a simple production. Many hours of preparation are necessary. The accelerator must be functioning properly, explosives and experiment materials and x-ray film protector must be positioned, and the multitude of instruments that record various events in every shot must be in order. Precision in adjustment and data recording are especially important if the experiment is part of a series where duplicate conditions are to be achieved.

The dominant feature of the PHERMEX complex, which is on a mesa at R Site (TA-15), is a rounded concrete building some 30 yards long, looking somewhat like a partially submerged submarine. Inside, safe from blast and shrapnel, are the principal components of the accelerator—the electron injector, three 32-ton copper-clad steel cylinders that are the resonating cavities for the standing wave accelerator, vacuum pumps to reduce cavity pressure to that corresponding to a vacuum tube, and an assortment of auxiliary equipment. To the west, behind a thick earth berm, is the concrete control room which houses the radiofrequency amplifiers and their controls. It must be safe from both the explosion and the radiation field that is generated when the machine operates. A tunnel leads to additional instrumentation in a parti-

ally buried bunker near the firing point where more equipment is located for properly conducting the experiments.

The electron beam, which is about an inch in diameter and has a current of about 70 amperes when it leaves the third cavity, is focused to a diameter of three millimeters by the time it strikes the tungsten target, which is at the end of a 30-foot tube that carries the beam outside the building and peeks through a blast shield of sandbags and steel matting.

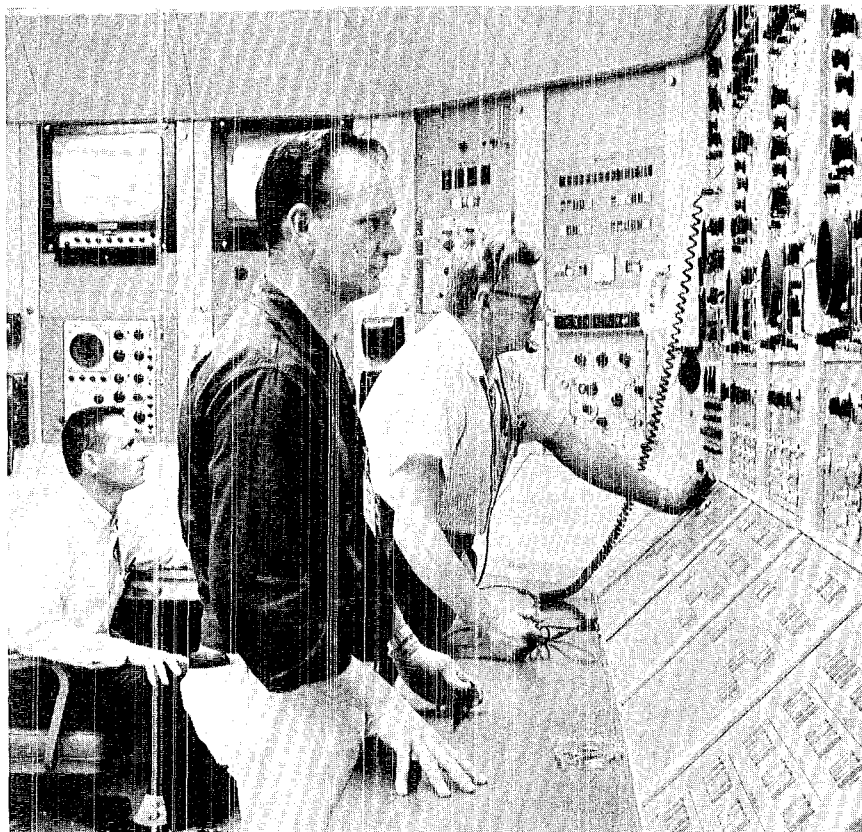
X-rays are produced when the high-speed electrons, which are negatively charged, approach the positively-charged tungsten nuclei. The electrons change course and speed, giving up energy in the form of radiation. This interaction is called "bremsstrahlung." These forward-going x rays in the form of an invisible cone-shaped beam travel about 10 feet to the experiment and another 27 inches to the recording x-ray film in its protective container.

All this must take place, of course, at the exact moment that the desired shock wave or pressure condition exists which is to be observed.

After the shot, which may involve many tens of pounds of high explosives, the aluminum film container is usually found some distance away, battered but not penetrated. Subsequent treatment of the film is no different from any other x-ray development procedure.

PHERMEX produced its first beam in August of 1963, some six years after GMX-11 was established. The facility, which cost about \$4,000,000 to build, is the outcome of a technical proposal written by T. J. Boyd, R. G. Shreffler, F. R. Tesche, and Douglas Venable. Shreffler since has become Alternate W Division Leader while the others are still in the group.

After the acceptance of this proposal by the Laboratory in 1957, and a subsequent appropriation of funds by Congress, the group launched a series of investigations



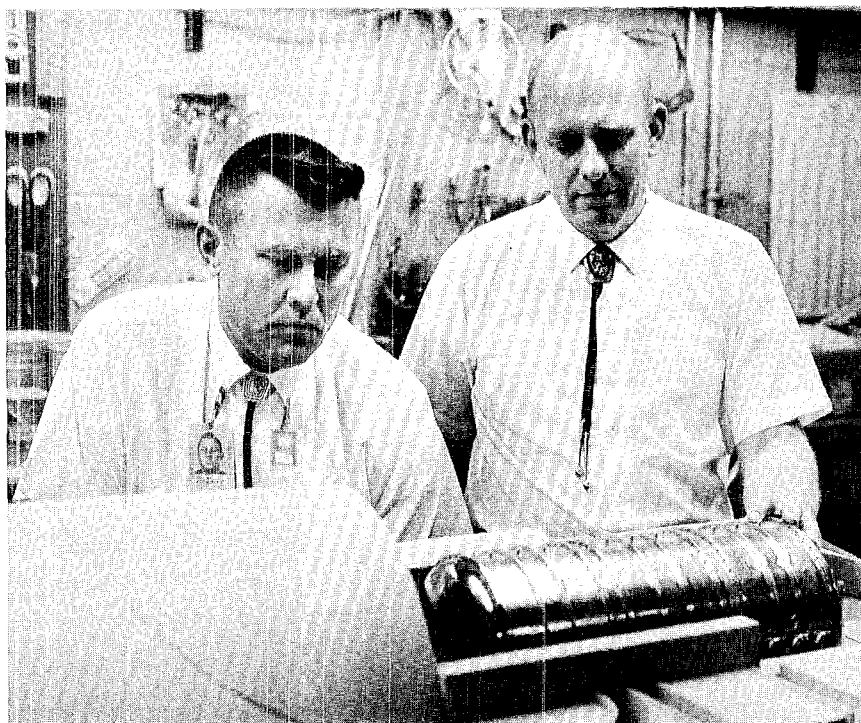
Tom Boyd holds button that triggers PHERMEX beam. Ed Schneider (left) and Jack Busick keep close watch on instruments. Main control console is in the Power Control Building. Use of closed circuit television provides visual monitoring of the firing area.

Fred Tesche (left) and Doug Venable, members of the team that first proposed PHERMEX, study a detailed scale model being built by the ENG-1 model shop. Model will be used for special exhibits and orientation tours.

to make sure theory would be confirmed by experiment. Prototype components were made and performance studies conducted, successfully, leading to detailed design and planning of the final installation.

The GMX-11 team consists of 13 staff members, 18 technicians and 9 administrative employees. Group activity is divided three ways: Weapons Program, Research Activities, and Machine Operation and Maintenance. Venable, who is Alternate Group Leader, is primarily associated with research.

PIERMEX is entitled to many superlatives—biggest x-ray machine of its type, highest beam current of a standing wave electron accelerator, etc.—but it is most outstanding as a specialized diagnostic instrument in the rather specialized field of high pressure hydrodynamics.



# *The Technical Side*

**Presentation at Seminars:** University of Wyoming, April 2; Denver University, April 6 (Papers I and II); Chemistry Club & Physics Dept., Colorado State, April 7; Seminar at LRL, Livermore, April 15 (Paper II):

I "Recent Experiments with Polarized Protons" by L. Rosen, P-DO.

II "Meson Physics and the Proposed Los Alamos Meson Facility" by L. Rosen, P-DO.

**Annual Meeting of Astrophysicists from High Altitude Observatory, Boulder, Colo., and Sacramento Peak Observatory, New Mexico in Santa Fe, N.M., April 21-23:**

"Identification of Some Intense Lines in the Solar Spectrum Near 170 Å" by Robert D. Cowan, T-DOT, and Nicol J. Peacock, P-15.

**Meeting of New Mexico Society of Professional Engineers, Albuquerque, April 26:**

"The Engineer's Role in Air Pollution Control" by H. F. Schulte, H-5.

**American Physical Society Meeting, Washington, D.C., April 26-29; and Physics Colloquium, University of Oklahoma, Norman, April 30:**

"Cross Section Measurements Made with Neutrons from a Nuclear Detonation" by Arthur Hemmendinger, W-8. (INVITED PAPER) Note: The above paper was also presented by H. M. Agnew, W-DO at the Phi Kappa Phi and Staff Colloquium at New Mexico State University, Las Cruces, May 14.

**Presentation at local chapter of the Institute of Electrical & Electronics Engineers, Los Alamos, April 29:**

"The Los Alamos Tandem Accelerator Facility on-line Computer" by Thomas Gardiner, P-1.

**Presentation at Sigma Pi Sigma Initiation Banquet, New Mexico State University, Las Cruces, May 1:**

"Production of Multi-Megagauss Fields by Explosives and Some Applications" by C. M. Fowler, GMX-6.

**COSPAR Meeting, Buenos Aires, Argentina, May 10-21:**

"Solar X-Ray Measurements" by J. P. Conner, S. Singer, and E. E. Stogsdill, all P-4.

"Spatial Distribution and Energy Spectra of Electrons Near 17.7 Earth Radii" by S. Singer, M. D. Montgomery, and J. P. Conner, all P-4.

**Second Annual ALO and ALO Contractor Health Protection Conference, Dayton, Ohio, May 1-19:**

"Neutron Detectors" by Dale E. Hankins, H-1.

"Chemical Fume Hoods" by H. F. Schulte, H-5.

**American Chemical Society Meeting, Phoenix, Arizona, May 13-14:**

"A Comparison of Some Least Squares Algorithms" by Roger H. Moore, T-1.

**American Foundrymen's Society Meeting, Chicago, Ill., May 10-14:**

"Plutonium-Cerium-Cobalt Fuel Development for Molten Reactors" by D. R. Harbur, CMB-11.

**International Meeting on The Application of Computing Methods to Reactor Problems, sponsored by the American Nuclear Society, Argonne National Lab., May 17-19:**

"Computing Methods for Rover Reactors" by C. B. Mills, T-DOT.

"A General Monte Carlo for Gammas" by E. D. Cashwell, T-8, and J. R. Neergaard, T-7.

"Use of the Discrete Ordinates Code DTF for Solution of Photon Transport Problems" by K. D. Lathrop, T-1.

"Recent Developments in Computer Technology and Their Implications for Reactor Calculations" by W. J. Worlton and E. A. Voorhees, both T-1.

"DPC, A Two-Dimensional Data Preparation Code" by B. M. Carmichael and W. H. Hannum, both K-1.

**Symposium on Nondestructive Testing in Nuclear Technology, Bucharest, Romania, May 17-21:**

"The Role of Nondestructive Testing in the Los Alamos Reactor Program" by G. H. Tenney, GMX-1.

**SAE A-6 Conference on New Roles of Fluid Power in Aerospace, Los Angeles, Calif., May 18:**

"Cryogenics in the Development of the Nuclear Powered Rocket" by F. J. Edeskuty, CMF-9.

**Conference on Applied Thermionic Technology, Germantown, Md., May 13-14:**  
(CLASSIFIED MEETING)

"Status Report on Irradiation of Mo 40 v/o UO<sub>2</sub> Cermet Fuel" by W. A. Ranken and E. W. Salmi, both N-5.

**High Temperature Fuels Committee Meeting, General Electric, NMPO, Cincinnati, Ohio, May 18-20:**  
(CLASSIFIED MEETING)

"High Temperature Plutonium Materials" by J. A. Leary, W. C. Pritchard, R. L. Nance and M. W. Shupe, all CMB-11.

"Status Report on Irradiation Studies of MoUO<sub>2</sub> Fuel" by William A. Ranken and E. W. Salmi, both N-5.

**Presentation to Student Chapter, American Nuclear Society, Kansas State University, May 20:**

"Some Design Aspects of Nuclear Propulsion Reactors" by David J. Blovins, N-3.

**Thirteenth Annual Meeting of the Radiation Research Society, Philadelphia, Pa., May 23-26:**

"A Study on the Effective Residual Dose Concept of Exposure to Ionizing Radiation" by J. F. Spalding, H-4, P. McWilliams, T-1, J. Basmann and W. H. Langham, both H-4.

"Erythrocyte Size Distributions Following Radiation-Induced Bone Marrow Arrest" by M. A. Van Dilla, J. M. Hardin, N. J. Basmann and J. F. Spalding, all H-4.

**Seminar, Chemistry Department, Montana State College, May 24:**

"Ideal Structures and Real Equilibria" by Guy R. B. Elliott, CMF-2.

**Presentation at Sigma Xi Chapter, South Dakota School of Mines & Technology, May 6:**

"Problems and Progress in the Analysis of Space Age Materials" by Charles F. Metz, CMB-1.

**IAEA Symposium on Pulsed Neutron Research, Karlsruhe, Germany, May 10-14:**

"Fast Burst Reactors in the USA" by Thomas F. Wimet, N-2.

**Symposium on Engineering Problems of Controlled Thermonuclear Research, Lawrence Radiation Lab., Livermore, Calif., May 5-7:**

"The Development of an Interleaved, Fractional-Turn Coil" by Robert S. Dike, Edwin L. Kemp, both P-16, and John Marshall, P-17.

"Capacitor Bank Charging System" by Thomas M. Sprague, P-16.

"Electrical Characteristics of Coaxial Cables" by Grenfell P. Boicourt, P-16.

"Problems Associated with Pulse Charged Capacitor Banks" by A. E. Schofield, P-14.

"Sherwood Engineering Techniques at Los Alamos" by Edwin L. Kemp, P-16.

**Annual Meeting of the American Ceramic Society, Philadelphia, Pa., May 1-6:**

"Mixing Theory Applied to the Prediction of Maximum Packing Density of Ceramic or Metal Powders," by H. D. Lewis, CMF-13, and A. S. Goldman, T-1.

"Epoxy Bonded Machinable Ceramics" by R. E. Cowan and E. P. Ehart, both CMB-6.

"Irradiation Damage to Ceramics and Metallic-Ceramic Bonds" by S. D. Stoddard, CMB-6 and A. J. Patrick, N-5.

"Compatibility of Refractory Metals with Solid Solution of UC:ZrC at Elevated Temperatures" by K. V. Davidson, R. E. Riley and J. M. Taub, all CMB-6.

"Solid Solution Carbides of Uranium and Zirconium" by K. V. Davidson, Robert E. Riley, and James M. Taub, all CMB-6.

**Forty-first Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Flagstaff, Arizona, May 2-6:**

"Four Ultracentrifuge Computer Programs" by G. R. Shepherd, P. N. Dean, and B. J. Noland, all H-4.

**Nineteenth Annual Convention of the American Society for Quality Control, Los Angeles, Calif., May 3-5:**

"On the Proper Use of Transformations of Log Normal Functions in Small Particle Statistics" by A. Goldman, T-1; H. D. Lewis, CMF-13; and Roger H. Moore, T-1.

**Presentation at Nuclear Engineering Department, University of California, Berkeley, May 10; and at Physics Div., Lawrence Radiation Lab., Livermore, May 11:**

"The Neutron Half-Life Measurement in Progress at the Ris Laboratory" by Wilbur K. Brown, P-3.

**International Federation of Information Processing Congress, New York City, May 24-28:**

"Applications of a Language for Computing in Combinatorics" by Mark B. Wells, T-7.

**AIHA Annual Meeting, Houston, Texas, May 3-7:**

"Technical Writing for Do-It-Yourselfers" by Helen M. Miller, H-5.

"Random Thoughts on the Health and Safety Aspects of Nuclear Powered Rockets" by T. L. Shipman, H-DO.

"Recent Progress in Thermonuclear Research" by F. L. Ribe, P-15.

"Evaluation of Effluents from Tests of Nuclear Rocket Engine Prototypes" by Robert V. Fultyn and Richard W. Henderson, both H-8.

"Source Measurements: Determining the Release From a Point Source by Remotely Located Samplers" by Richard W. Henderson, H-8.

**Presentation at Department of Physics & Astronomy Seminar, University of New Mexico, Albuquerque, May 5:**

"Electronic Cell Sizing" by M. A. Van Dilla, H-4.

"The Cell Separator" by M. J. Fulwyler, H-4.

**IAEA Symposium on Radioisotope Sample Measurement Techniques in Medicine and Biology, Vienna, Austria, May 24-28:**

"Automatic Data Acquisition, Reduction and Analysis" by P. N. Dean and C. R. Richmond, both H-4.

**American Vacuum Society, New Mexico Section Annual Meeting, Albuquerque, May 6-7:**

"The Use of Vacuum in Plutonium Research" by Karl W. R. Johnson, CMB-11.

"An Ultra High Vacuum Knudsen Apparatus" by William M. Olson, CMF-5.

"Operational Characteristics of a Large Ion Pumped Vacuum System" by Hairston G. Worstell, P-11.

**Sixth Annual Meeting of Eastern Idaho Chapter of the Health Physics Society, Idaho Falls, May 15:**

"Radiation as a Problem in Manned Space Flight" by W. H. Langham, H-4.

## A Proposal:

# Salinas Monument

By JOHN V. YOUNG

If the State of New Mexico or some of its public-spirited citizens would raise about \$40,000 to buy some marginal land, two of its most impressive historical monuments could be taken into the National Park System, thus guaranteeing their preservation and taking a financial burden off the shoulders of the Museum of New Mexico. Properly developed, they could also become important tourist attractions.

The monuments are the 17th century mission and adjacent pueblo ruins at Abo and Quarai, near Mountainair. The U.S. Department of the Interior looks favorably upon a proposal to combine these two big ruins with nearby Gran Quivira National Monument, to form a new 3-section Salinas National Monument. The name comes from the Spanish word for salt, applied to the region because of the many salt lakes thereabouts. The natives of the three ancient communities, now

entirely extinct as a people, were known as the Saline or Salinas tribes, their economy being based on the salt deposits. Until 1959, part of Gran Quivira was a State Monument and so it still appears on most road maps, although it has since been entirely absorbed into the larger national monument there.

While the State has been trying quite actively since 1939 to get the Federal Government to take over all the State Monuments, there is a special difficulty at Abo and Quarai. Both are surrounded by private ranches which so closely intrude on the scene as to destroy the requisite historic setting.

As a Park Service report states, "Immediately outside the boundaries of each monument, and conspicuously visible from within, are houses, ranch structures, windmills, assorted vehicles, and domestic animals belonging to private landowners. The visual intrusion is

Of the three missions in the Salinas group, Abo is in the most advanced state of deterioration, but enough remains to show that it was once a majestic structure. Like Quarai, it is built of natural red sandstone bricks.

especially clashing on the land surrounding Abo, where at least five ranch complexes make a savoring of the area's historical atmosphere extremely elusive." Buffer strips of land are needed to set the monuments off from the more modern surroundings, and to provide room for public facilities, picnic areas, and administrative quarters, the report concludes.

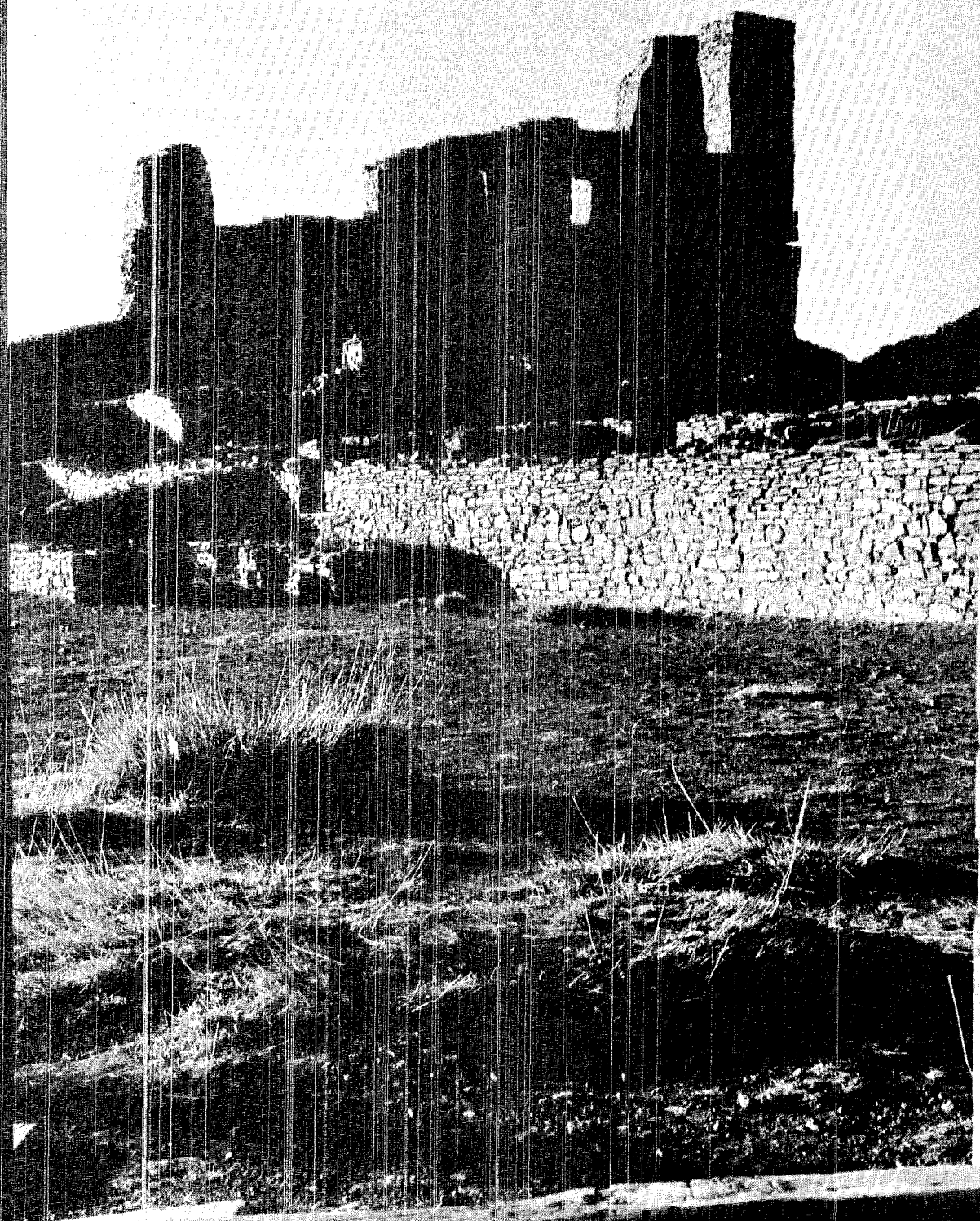
The same kind of difficulty delayed for years the Federal acquisition of Pecos State Monument, a somewhat similar ruin of the same period, 26 miles east of Santa Fe. It, too, needed a buffer strip. However, this was handsomely provided in 1964 by the gift of 278 acres of land by E. E. Fogelson, owner of the adjacent Forked Lightning Ranch, and his wife, actress Greer Garson. The Fogelson gift entirely surrounds the former 62-acre Pecos State Monument area and takes in as well other associated ruins of great historical value.

Legislation establishing Pecos National Monument has already cleared the House of Representatives and probably will be passed by the Senate and become law during this session of Congress.

It is possible that legislation will be introduced in Congress to provide for Federal purchase of the additional lands needed at Quarai and Abo, but because of the considerable expected expense in restoring and maintaining the monument, the proposal has a far better chance of going through if the land can somehow be donated. Like Pecos, the three missions are clas-

continued on page 24







The massive walls of Quarai mission, north of Mountainair, are built of thousands of natural red sandstone bricks. This is perhaps the most impressive of 17th century Spanish mission structures remaining in New Mexico.

## Missions . . .

continued from page 22

sified by the Interior Department's Advisory Board on National Parks, Historic Sites, Buildings, and Monuments as being of exceptional value in the "Contact with the Indians" theme in the nation's history. Although all three monuments are fairly close to transcontinental U.S. 60, almost at the exact geographic center of the State, they are little known to tourists or even to the rest of the State. Visits at Gran Quivira have been running less than 10,000 a year and probably no more than that at the two State Monuments, where no register is maintained.

Abo is located 9 miles southwest of Mountainair and a mile off the highway; Quarai is 6 miles to the northwest, a mile off State Highway 10. Gran Quivira is 25 miles south of Mountainair, also on State Highway 10. All are served by paved roads, and marked by historical signs, although those at Quarai and Abo have faded badly.

The missions of San Gregorio de Abo, La Purisima Concepcion de Quarai, and San Buenaventura de los Humanas (Gran Quivira) thrived during the middle of the

17th century, serving the numerous pueblos of what was then known as the Salinas province.

The Spanish explorer-merchant Espejo visited Abo in 1583, Coronado having missed the pueblos in his 1540 adventures. Oñate came to stay in 1598 and assigned missionaries there from his Pecos headquarters. But serious missionary work did not start until 1620, and the first church was started in 1629, presumably by the Franciscan Padre Francisco de Acevedo. The Indians of Abo, like those at Gran Quivira, spoke the Piro language, apparently related to the Mogollon culture of Arizona. Those at Quarai spoke Tiwa, a language still used today by the inhabitants of Isleta, Taos, Picuris and Sandia pueblos to the north. Habitation in the region probably dates to 800 A.D., or earlier.

The mission at Quarai, built in 1629, became the seat of the Spanish Inquisition in New Mexico. From then until the mid-1670's a succession of Franciscan missionaries lived there, introducing many new ways of life along with a new religion, agriculture, the use of domestic animals, and Spanish goods. They probably introduced at the same time the seeds of social dissolution, the almost inevitable

result of a clash between two cultures dislocated in time by centuries.

There was almost continuous friction between the church and the State, with the Indians in the middle. The Indians even revolted at Quarai, but the uprising was quickly put down. However, disease, increasing Apache attacks and the great droughts of the 1660's and 1670's doomed the pueblos. One by one they collapsed, and their few remaining people fled to Socorro and to other friendly pueblos. By 1675, they had all gone. Many of these people joined the Spanish in their flight down the Rio Grande during the Pueblo revolt of 1680. Some settled in the vicinity of El Paso and were absorbed by the Mexicans, while others lost their identity among other tribes.

A similar fate befell Pecos, whose last 17 people in 1838 fled to Jemez, where the anniversary of their arrival is still celebrated each year, but there is no such remembrance of the people of Quarai, Abo, and Gran Quivira.

But if the people are vanished without a trace, their buildings are still among the most impressive ruins in the Southwest. Constructed of natural bricks (red sandstone at

Abo and Quarai, dolomite limestone at Gran Quivira), some of their massive walls still stand 40 feet high and up to eight feet thick. Those at Quarai are probably without equal for their grandeur, reminding one of a medieval European fortress.

The church and adjacent convento at Abo were excavated, partially restored, and stabilized by the School of American Research and the Museum of New Mexico between 1935 and 1939. Similar work at Quarai was performed by the Museum. Only small parts of the associated pueblos have been excavated, but extensive mounds of rock and earth mark their outlines. Quarai became a State Monument in 1935 and Abo in 1938, under the administration of the Museum of New Mexico.

The Abo ruins were suggested for National Monument status by the General Land Office as early as 1916. Regional Archeologist Erik Reed said in a 1940 report that the National Park Service was interested in Abo, and his Historic Site Survey report of that year recommended designation of Abo as a National Historic Site, without federal acquisition, through cooperation with the Museum of New

Mexico. A similar report in 1939 had recommended such treatment for Quarai. In 1941 Dr. Reed advanced the proposal for a Salinas National Monument, which would combine Abo and Quarai with the existing, and historically related, Gran Quivira National Monument into one administrative area.

The State of New Mexico first suggested the transfer of all of its State Historical Monuments to the National Park Service in 1939. When the Museum of New Mexico indicated in October 1947 a desire to transfer the monuments at Jemez, Pecos, Abo, and Quarai to the Federal Government, together with the State-owned lands at Gran Quivira, the matter was referred to the Federal Advisory Board at its April 1948 meeting. While the Board took no formal action on this proposal, the consensus was that the State should be encouraged to maintain these properties for the time being.

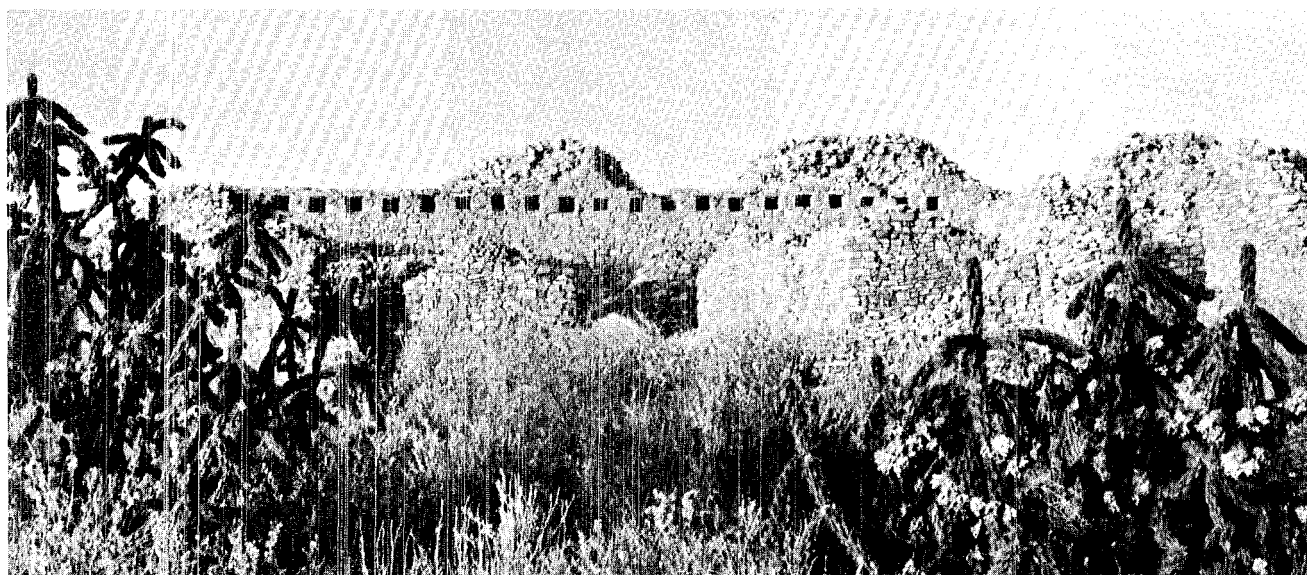
The most recent, and firm, offer regarding Abo and Quarai (as well as Pecos) was expressed in a letter to the Director of the Service, dated July 10, 1961, from then Director K. Ross Toole of the Museum of New Mexico. This letter professed that reorganization of the Muse-

um's activities—aimed at concentrating its limited operating funds upon pure museum functions—looked toward the transfer of these State Monuments to more suitable and better equipped custodianship. When Abo and Quarai were next taken up by the Advisory Board, at its 1962 spring meeting, they were evaluated this time in the National Survey Theme VIII—"Contact with the Indians"—and classified therein as having exceptional value. On the basis of these actions and discussions with Museum of New Mexico people during the year, the National Park Service Director of December 1962 requested the Southwest Regional Office to undertake a suitability-feasibility study of the merits of Federal ownership for Abo and Quarai.

Following this study the Advisory Board, at its March 1963 meeting, recommended that Abo and Quarai "be accepted as donations from the State of New Mexico and, together with whatever additional land is required for proper administration, the sites be established through appropriate means as units of the National Park System."

And there it stands.

*Gran Quivira National Monument, constructed of dolomite limestone, is a study in pastels and complex masonry similar to that at Aztec National Monument.*



Big Rock rapid almost ended the race for Ted Cotter, W. H. Reichet, Luther Lyon and Sam Skaggs, but they made it through to finish third.

Text and photos by John V. Young

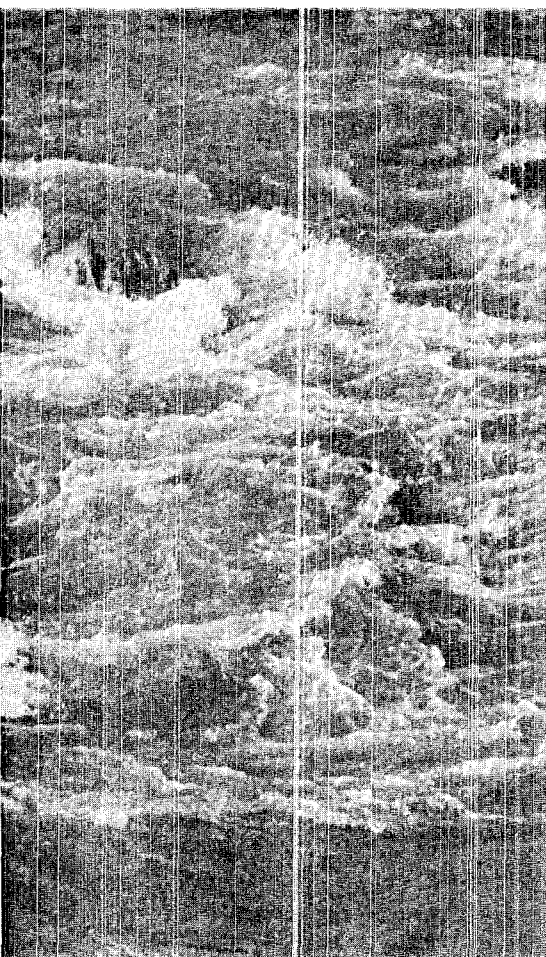


# WHITE WATER

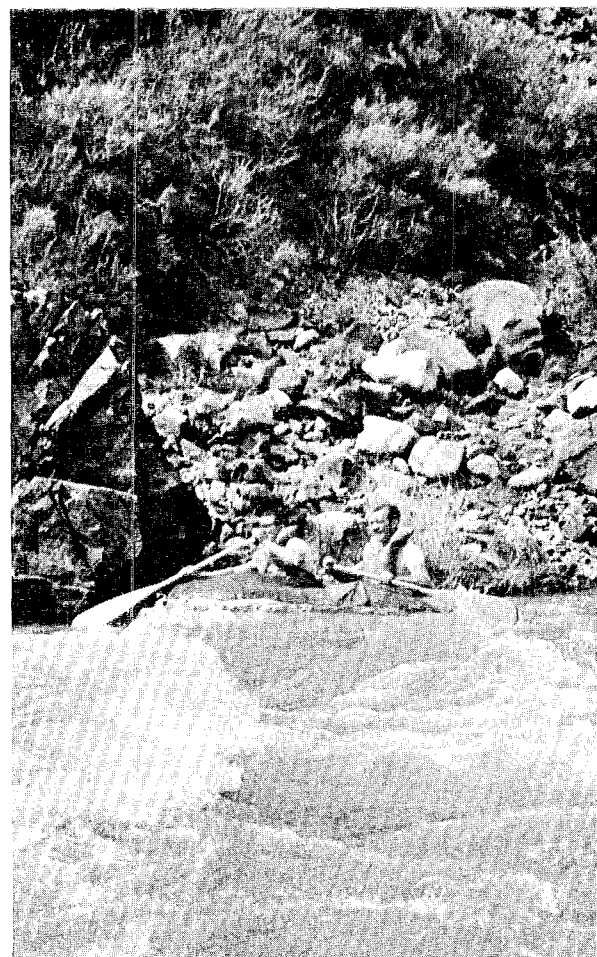
All but 10 of the 33 mild maniacs who celebrated spring on May 2 by getting wet in the eighth annual Rio Grande white water run for kayaks and rubber rafts were associated with Los Alamos Scientific Laboratory. So were many of the two or three thousand spectators who lined the Taos highway below Pilar to watch the fun.

This report by James A. "Stretch" Fretwell of CMF-9, who managed the event, probably accounts for something or other about the race. Four kayaks were overturned, one wrapped itself around a boulder, and several crewmen were left behind when their craft stood on end in a hole in the water or tried to climb a boulder. Everyone was waterlogged but nobody was hurt, although several narrowly escaped being beamed by beer cans tossed from the highway.





Chuck Terrell and Sherman Armstrong went down the far side of Big Rock rapid and came in first for their class.



Out-of-towners made a clean sweep in the kayak class, as the only LASL entry did not finish. First place winner was Leo Coleman, Jr., who paddled down from Denver for the occasion. In the slower rubber raft class, all entries were from I.A.S.L. with Charles L. Terrell and Sherman V. Armstrong, both of CMB-6, in first place. The winning rafts even beat some of the kayaks, although they had trouble maintaining full crews and sometimes had to stop for rescue operations.

The 4.7-mile course starts just below the Pilar junction and ends at the Taos-Rio Arriba County line, negotiating on the way some tricky, boulder-strewn rapids, Big Rock Bend, where the river narrows to 10 feet, and a whirlpool hole at the entrance to an irrigation ditch.

continued on next page



Carole and Joe Hafele were the only man and wife team in the race, shown here clearing Big Rock.





Jessie Rudnick (left) and Lore Watt, only 2-woman team in the race, are ready to put their craft in the river.

## Water . . .

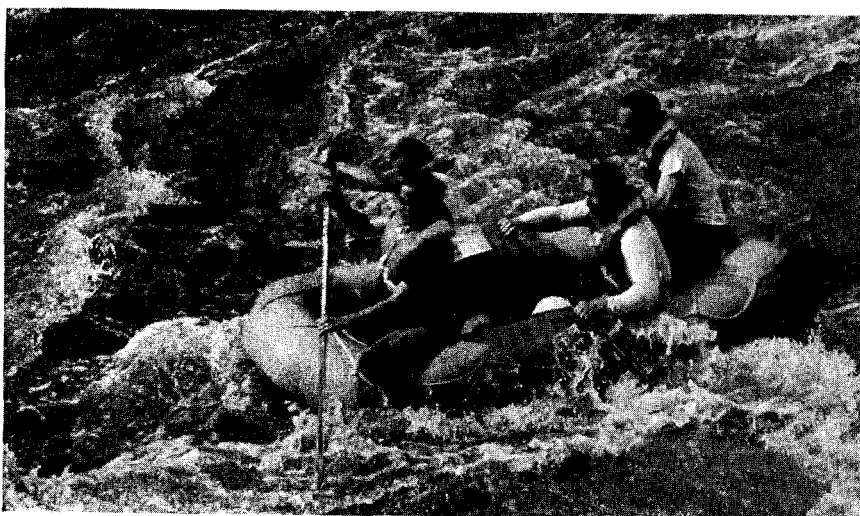
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(Anyone taking a short-cut down the ditch is disqualified.) Coleman's winning kayak made the run in 30 minutes, 10 seconds; the winning raft in 50 minutes, 10 seconds. Some came in half an hour later and some did not come in at all. One contestant quit after traveling a mile or so under his kayak, a bone-chilling experience.

Ed Storms of CMB-3, who finished seventh, lost a paddle in a rapid but had it returned to him by a fisherman who snagged it with his fly outfit. The delay put him out of the running, however. Mrs. Paul Rudnick (T-DOT) and Mrs. Bob Watt, the only two-woman team in

the race, who came in ninth, said they were just along for the practice. But despite the fact that one of them was left behind on a standing wave and had to run to catch up, they finished less than six minutes behind the next raft.

Other LASL contestants were: Edward J. Schneider, Bobby F. Poe, Roger London and Gary W. Rodenz, all of GMX-11, second place; Ted P. Cotter, W. H. Reichler, Luther L. Lyon and Samuel R. Skaggs, all of N Division, third place; John Lundgren and Don Kirkpatrick, both of K-1, fourth; Richard J. Watts, K-DO, and Walter Willis, CMF-9, fifth; Brant Calkin, CMB-6, sixth; Joe C. Hafele, P-DO and his wife, Carol, eighth.



Second place winner for rubber rafts in the May 2 Rio Grande white water classic were Edward Schneider, Bobby F. Poe, Roger London and Gary W. Rodenz, all of GMX-11.

## *PUB Staffer Savage Wearin' Erin's Green*

John N. Savage, who for the past eight years has been the Laboratory's written "voice" to the Atomic Energy Commission and Congress, is moving to Ireland to resume an earlier free-lance writing career.

He was assistant group leader of D-7, the public information group that preceded the establishment of the Public Relations Office, from 1957 to 1959.

As a contract employe of PUB since 1960, Savage was responsible for compiling and writing the many non-technical and semi-technical reports to the AEC, relating in language understandable to a Congressman the Laboratory's roles in the nation's atomic energy program.

His contributions usually appeared in such documents as the AEC's Annual Report to Congress and Fundamental Nuclear Energy Research report series.

He is also the author of a number of the widely-praised and widely-distributed educational booklets that are published by PUB, and was the editor and chief writer of the "First 20 Years at Los Alamos" which was published in 1963. Most recently he has written a "primer" on the artificial production of heavy elements by multiple neutron capture, which appeared in the March and April issues of *The Atom*, and has collaborated with Barbara Storms on a history of the first nuclear weapon, which will be published as a special edition of *The Atom* in mid-summer.

Savage, 47, is a native of California and a B.A. and M.A. Berkeley graduate of the University of California. He also studied in Mexico and at the University of Paris. He was a successful novelist and short-story writer and literary agent in California and Connecticut for many years and was a professor of English and Literature at Washington University in St. Louis, Mo., for two years before joining LASL in 1957.

Savage, his wife and children are leaving their home in Santa Fe to take up residence in Belfast, Ireland, for an undetermined time.

## WHAT'S DOING

**FILM SOCIETY:** Civic Auditorium. Film shown 7 and 9:15 p.m. Admission by season ticket or 90 cents single admission.

Wednesday, June 16, "Tomorrow Is My Turn," 1961 French production of Andre Coyatle's poignant and absorbing story of two French civilian soldiers and their experiences as farm-hand prisoners of war in Germany. 118 minutes.

**SOAP BOX DERBY CLINICS:** YMCA Building, 10 a.m., June 12, 19 and 26. For boys and parents in preparation for July 10 races.

**ST. JOHN'S COLLEGE FILM SOCIETY:** Great Hall at the Student Center in Santa Fe. Film shown at 7:30 p.m.

Saturday, June 5, "The Lavender Hill Mob," comedy produced in England in 1950 with Alec Guinness, involves a scheme by two very mild characters to rob the British Mint of its gold bullion and abscond to France with the loot.

**YOUTH OPERA LECTURE:** Open to the public, no charge, sponsored by Los Alamos Opera Guild and Los Alamos Schools Music Department.

Sunday, June 27, "La Traviata," lecture by Mrs. Lewis Agnew, 7 p.m., Pajarito School Auditorium.

Thursday, July 1, "Madame Butterfly," lecture by Mrs. John Northrop, 7 p.m., Pajarito School Auditorium.

**OUTDOOR ASSOCIATION:** No charge; open to the public. Contact leader for information on specific hikes.

Thursday, June 3, evening hike. Marlene Cackle, leader.

Saturday, June 5, Upper Guaje Canyon and the mountains just west of Los Alamos. Bob Skaggs, leader.

Thursday, June 10, Association meeting at home of Dibbon Hagar, 1013 Iris, A12.

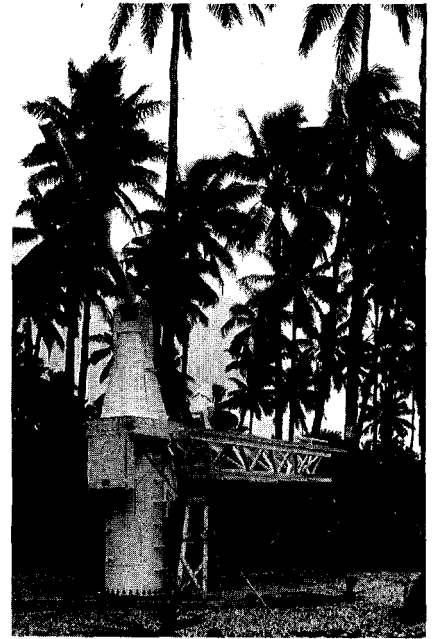
Saturday, June 12, Lake Peak and Penitente with return on the Winsor Trail. Hike is timed to see alpine flowers in bloom.

Thursday, June 17, evening hike. Don Rose, leader.

Sunday, June 20, Aspen Ranch to Nambé Lake and then to the Ski Basin. Terry Gibbs, leader.

Thursday, June 24, evening hike. Ken Ewing, leader.

Sunday, June 27, Johnson Lake, one of the high lakes in the Pecos Wilderness Area. Marlene Cockle, leader.



**REPORT**

**FROM**

# RAROTONGA

The "WE AMERICANS" on the crude sign nailed to a palm tree trunk is reference to a contingent of LASL and Sandia Corporation scientists who set up shop on the South Pacific island of Rarotonga to make observations of the May 30 total eclipse of the sun.

Instruments designed and built by LASL's P-4 group were fired into the eclipse shadow aboard Nike-Tomahawk rockets launched by Sandia people. Sandia also provided a telemetry crew. The experiments were to study x-rays coming from the sun's corona.

The pictures on these pages were taken by Harold Argo of P-4, who no doubt relished his camera assignment while the portable power generator was being pushed into position. In the polka-dot shirt is Sid Singer of P-4. Others there from LASL were Michael Montgomery and James Bergey. Also pictured is part of the launcher assembly.

Rarotonga is owned by New Zealand. The LASL-Sandia scientific settlement was on a farm rented for the occasion.

Other observations of the eclipse were made by LASL scientists with instruments mounted in the Laboratory's NC 135 jet aircraft that is kept in readiness for weapons tests diagnostics. After the eclipse flight, which was based on American Samoa, the airborne scientists headed for Australia for aerial studies of cosmic rays in the vicinity of the South Magnetic Pole.



## *Science Fair Prizes To Pat Anderson And Lab Visitor*

A Los Alamos High School senior—Patricia Anderson—and a New Jersey boy whose exhibit was inspired by a visit to LASL were winners of special Atomic Energy Commission awards at the National Science Fair—International in St. Louis, Mo., last month.

Patricia is the daughter of Mr. and Mrs. James C. Anderson. Her father is a staff member in GMX-7.

She was one of 10 finalists from New Mexico who competed with more than 400 young people from the United States and half a dozen foreign countries.

Patricia's winning exhibit was titled "X-Ray Induced Chromosome Breakage." Her award includes an expenses-paid visit in August to Argonne National Laboratory near Chicago to participate in "Nuclear Research Orientation Week." Her high school biology teacher, Robert O. Eiklerberry, also wins the Argonne trip.

Frederick R. Aronson of Hillsdale, N.J., won a similar AEC award with his exhibit on "Genetic Changes in Behavior Produced by Low Levels of X-Irradiation in Mice." Frederick became interested in the study of radiation effects on mice when he visited Los Alamos during the National Science Fair that was held in Albuquerque in 1963. He has been exchanging information with John Spalding of H-4, who is in charge of the mice irradiation program at LASL.

Frederick won an AEC special award with a somewhat similar exhibit at the Science Fair in Baltimore, Md., last year.

## JCAE Recommends Funds To Further LAMPF Plans

The Congressional Joint Committee on Atomic Energy last month recommended that \$3.2 million be included in the forthcoming fiscal 1966 Federal budget for continued planning and design of the Los Alamos Meson Physics Facility and urged that the full \$55 million needed for actual construction of the powerful linear accelerator be included in the fiscal 1967 budget.

The JCAE action was hailed by LASL Director Norris Bradbury as an "important forward step" reflecting the interest and support of New Mexico Senator Clinton Anderson and Representative Thomas Morris in the continued strength and growth of the Laboratory.

Full Congressional approval is necessary before the additional funds are assured. Final budget approval usually occurs in July or August; the fiscal year begins July 1.

If obtained, the money will be used in two ways—\$1.2 million for further architectural and engineering design and \$2 million for continued research and development of accelerator components.

LAMPF design and research is being carried on at Los Alamos by P-11 and by a Detroit, Mich., engineering firm. Congress approved a \$500,000 appropriation last year for preliminary research and design.

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## *Top 25 Seniors are Guests Of Los Alamos PBK Group*

The 25 top academic students in the 1965 class of Los Alamos High School were guests of the Los Alamos Chapter of Phi Beta Kappa for a dinner and awards program at the Lodge on May 23.

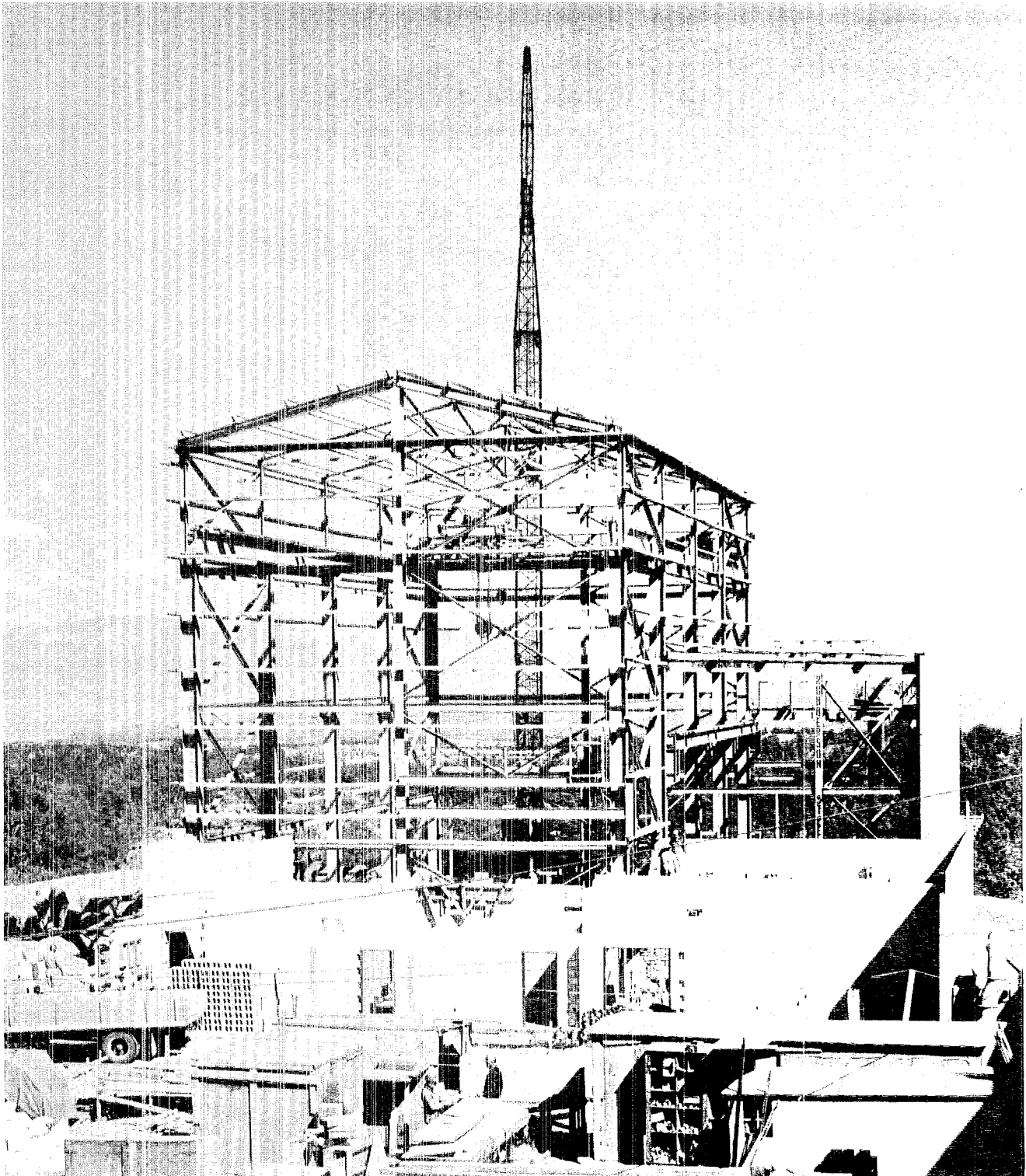
Winners of the Jay Woodward Award were Linda Barnes, Donna Schutz and Mary Thomas. Presentation was by Principal George Joyce.

Wright Langham, head of the LASL Biological Research Group, was speaker. His topic: "Some

Aspects of the Los Alamos Biological Research Program."

Guests were: Patricia Anderson, Margaret Bard, Linda Barnes, Christen Bemis, Charles Calvin, Christine Davis, John Deinken, Mark Durham, Martha Ennis, Peggy Everett, Carl Flock, Ruth Fowler, Carol Furchner, Margaret Koontz, Michele Kravitz, Andrew McQueen, Kenneth Morris, James Ribe, Margaret Roberts, Donna Schutz, Sandra Smith, Mark Summers, Katherine Sydoriak, Mary K. Thomas and Roger Waterman.





Steel skeleton that towers above Ten Site is the frame for building that will house Fast Reactor Core Test Facility. Equivalent of four stories in height, it will be one of tallest Laboratory structures. FRCTF will be a K Division in-

stallation for research with molten plutonium reactor fuel mixtures in a variety of reactor cores. Bill Jack Rodgers' photo looks east across the Rio Grande Valley to the peaks of the Sangre de Cristo Range.

Henry T. Motz  
3187 Woodland  
Los Alamos, New Mexico

